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CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

AN RBOC UNTANGLES ITS SYSTEMS

LANS GROW FROM LOCAL TO LINKED

US WEST's Winston J. Wade

AN INTERNATIONAL DATA GROUP PUBLICATION

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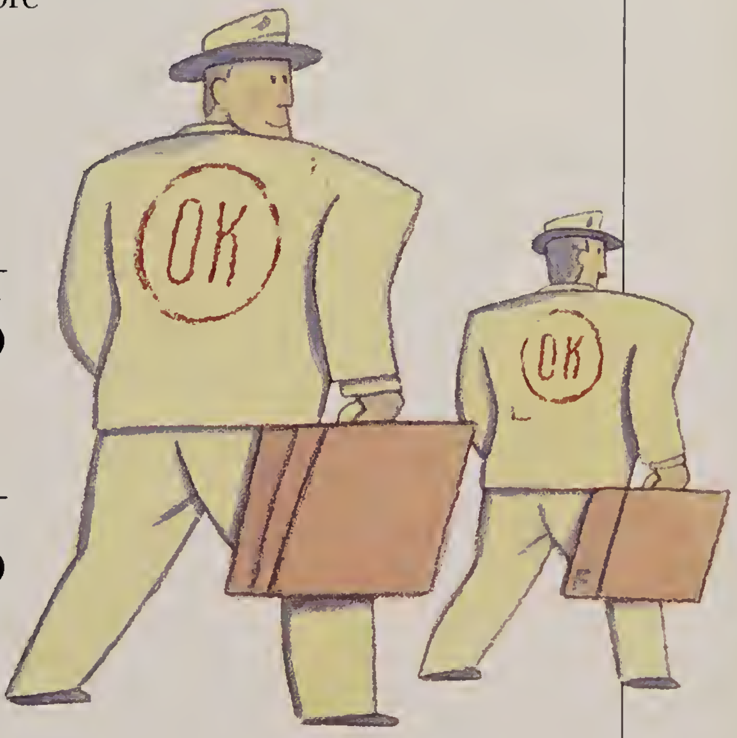

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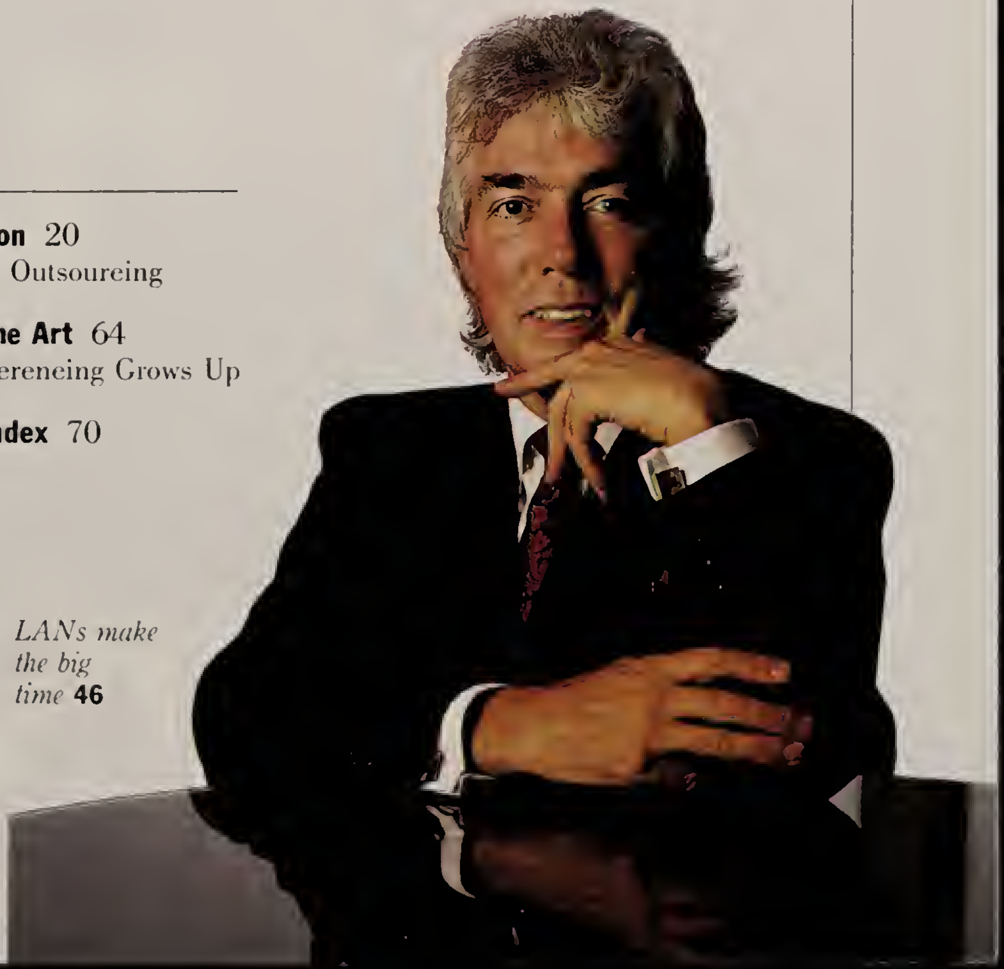
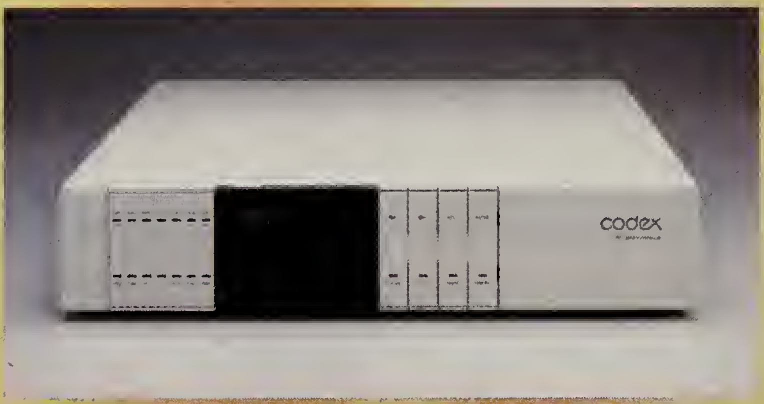


LANs make the big time **46**

INTRODUCING THE CODEX 3600 SERIES COMMUNICATIONS PLATFORM: THE TRANSMISSION SOLUTION FOR TODAY AND TOMORROW.



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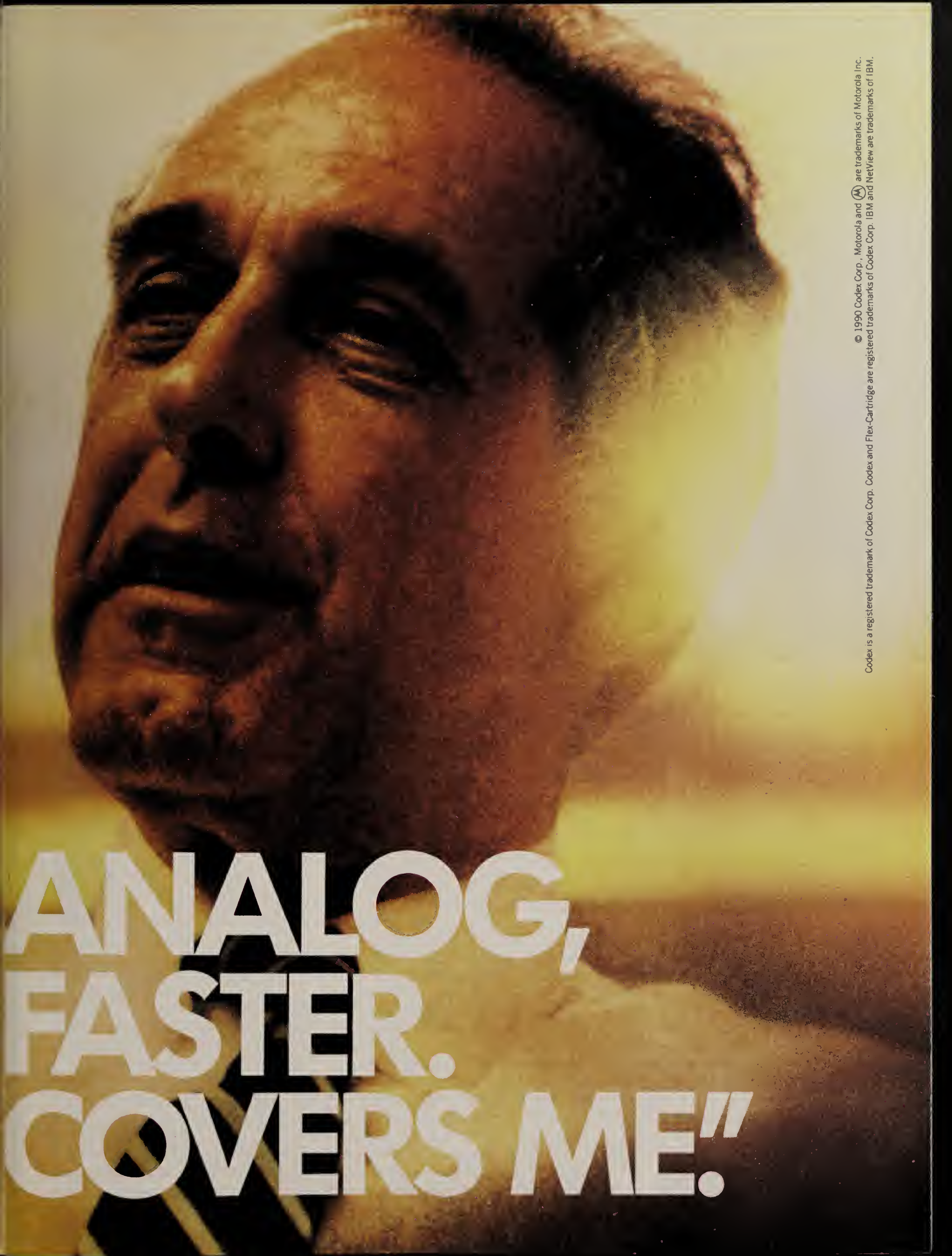

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Way back when—maybe about five years ago—local-area networks were seen as a good idea for sharing expensive computing resources (mainly the printer). And the topic was hot on the conference circuit. But, invariably, all you heard about LANs in those days were endless debates about which network configuration, token ring or star, was the best; and then there were equally interminable discussions about twisted-pair and coaxial cabling schema.

It seemed the debate would never end. But it has. Today, discussions of LANs center on information sharing. Once considered the domain of a particular department or workgroup, LANs today are in transition, becoming enablers of enterprisewide communication and inexpensive high-performance computing tools that empower users. As such, these networks are now regarded more as a corporate than a departmental resource. Information executives thus need to be far more involved than ever before in ensuring that these networks mesh with the organization's information systems architecture.

PHOTO BY RUSSELL WINDMAN

In our article "The Gathering of the LANs" (beginning on Page 46), Staff Writer Meghan O'Leary examines the LAN phenomenon in light of the emerging client/server computing model. Although this concept has been talked about for a few years, the growing efficacy of LANs is solidifying that model and, at the same time, bringing up a slew of issues centering around interoperability and ownership of information.

As one expert put it, the desktop power and linkages enabled by LANs are creating new corporate backbones that require a return to the structures and procedures users may have thought they left behind. Most enterprisewide information issues involve politics. And LANs are no exception. Some of those interviewed in our article said that the possessiveness users sometimes feel about their LANs—after all, "L" is for local, right?—has to be nipped in the bud before LANs can be effectively integrated corporatewide.

The idea of control was also a major issue to a reader who wrote us a letter in appreciation of our recent interview with the Gartner Group's Bruce Rogow. After listening to the concerns of our letter writer, Donald Blair (executive vice president and CIO of Perpetual Savings Bank), we persuaded him to write an article for our First Person column. "I Survived Outsourcing" (beginning on Page 20) depicts Blair's experience extricating a company he previously worked for from an outsourcing contract and rebuilding the IS function from ground zero. Blair observes that managing information represents a growing part of what drives a business, and that if information executives say they can't control the costs associated with such a crucial part of the business, then they're in for big trouble.

The growth of the power of LANs and the controversy surrounding outsourcing call attention anew to the observation that established technologies and management principles are constantly being upended and redefined in the changing business environment.

Marcia Blumenthal

CIO

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Off-the-Shelf Life

CIOs who scorn package software solutions should think again. Used well, they can be an expedient piece of the overall IS strategy

BY RON McEVOY

THE SOFTWARE THAT almost DOES IT
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CAUTION:
EASY TO USE!
SEE CAUTION ON SIDE PANEL

ILLUSTRATION BY SCOTT POLLACK

Package software often gets a bad rap. It's one thing to buy a word-processing or spreadsheet package off the shelf, many IS professionals believe, but purchasing package software to use on mainframes just doesn't cut it. Some customization is invariably necessary anyway, they argue, so why bother with commercial packages at all? You might as well just do it all inhouse.

But software packages can prove very valuable and helpful for shoring up or revamping IS infrastructures efficiently and fairly inexpensively. For companies in the throes of growth or consolidation, nothing may be more expedient or offer a better return on investment than buying package software. Other options—such as modifying internal programs or using third-party solutions—work in some instances, but they don't have the same potential to show such high rates of return.

Installing package software requires more than "using it as is," and anyone who believes it's that easy is doomed to failure. While the software is 80 percent complete when purchased, it's the 20 percent finetuning that is done postpurchase that makes all the difference. Successful installations must follow a detailed road map—a set of guidelines—that can show them the straight and smooth road. These guidelines comprise vendor selection, IS responsibilities, project task force, testing and implementation.

Without such a map to guide purchased-software implementation efforts, these undertakings can become rocky roads leading to dead ends. When this happens, users must bail out or start over again—both costly and time-consuming alternatives.

The IS team's full acceptance and control of this road map—at every stage of the journey—is the most important factor for success. Successful installation of commercial packages requires some very proactive methodologies. Unless the IS team takes 100 percent responsibility for selection, integration and implementation of the software, the project will most likely fail.

Because technologies change so rapidly, the 1990s will see a growing trend toward purchasing more package software. Additionally, with staffing levels becoming a primary management concern, packages that require less development costs and fewer developers will inevitably gain in popularity.

We have been following these guidelines at Ivey's department store for three years. Of the more than 20 major software systems that have been implemented during this period, more than 50 percent used package software. Although our motivation for going this route stemmed from a pressing business need to provide IS solutions quickly, the lessons we learned are relevant to any business situation. The end result—a healthy retail picture—makes this investment of time and money a worthy effort and one that we will repeat even more in the 1990s.

In selecting a package, there are certain bread-and-butter questions users must ask every potential vendor about their company's solvency, history and successful user sites. Additional questions, such as what other applications are available, whether there is an option for in-house maintenance and whether there is an ac-

CIO

July 1990

"Either you take charge of change or change takes charge of you."

John E. Rehfeld
President
Seiko Instruments, Inc.

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There are some basic, generally understood aspects of human nature that we quickly seem to forget when we are responsible for implementing change. One of these is that the vast majority of people hate to change. In fact, most people will tend to avoid change at all costs.

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CIO is designed to keep you at the forefront of the fast paced information industry. I hope you will attend our Fall Conference, "Information Strategies for the 90's: Thriving on Change," featuring John Naisbitt, author of *Megatrends 2000*. The conference will be held in Palm Springs on October 28-30. For complete information please call Lori Cardarelli at (508) 935-4631, or Diane Martin at (508) 935-4274.

Sincerely,

Joseph L. Levy
President and Publisher

P.S. -- I would appreciate hearing your comments, suggestions and ideas for future issues.

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Coming in CIO

The CIO 100

This year's edition of the *CIO 100* focuses on innovation, exploring the link between it and the use of IT.

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The Ties That Bind

CIO takes a look at how companies are using IT to improve customer services and relationships—and, subsequently, to lock in business.

Open Systems Update

What's new on the standards front? Have vendors accepted the inevitability of open systems? Are they working with user groups to achieve true interoperability? And where does Unix fit in? Stay tuned for the exciting conclusions. . . .

tive user group reveal how far a vendor will go to be part of the planning and implementation team. Are they willing to take office space in the company, sit with IS folks, integrate with them, and live and breathe with user departments?

To be a team player, the vendor must also demonstrate a professional attitude—one that is honest and open. Vendors that have a high integrity rating are likely to have a high installation success rate as well.

Potential buyers should consider other vendor selection factors, including the availability of training and support and vendor willingness to provide source code. Being able to agree on all these points goes far beyond a turnkey relationship. A vendor must be as committed as the customer to making the implementation successful.

Once the vendor has been selected, the IS department needs to assume full responsibility for project management. At this point the vendor should fold into the IS team, becoming an extension of the IS staff. All budgetary considerations—from selecting hotels for vendor representatives to determining lengths of on-site visits—are managed by the IS team. Using the IS team's standard application-development methodologies helps neutralize the feeling that they are working with a package program and makes the effort feel more like a customized process and system.

Of course, many vendors are reluctant to give up so much control. It then becomes the CIO's responsibility to sell this viewpoint of cooperation. He or she must make the vendor understand that for the project to succeed, a true, clear and complete partnership must exist between the customer and the vendor.

Along with the vendor and IS team, end users are an essential part of the project task force. End users—not the vendor or IS department—define the business need as well as the business benefit. And although the IS team must lead the project, it is the end users who, along with other project members, must decide if the projected business goals have been achieved.

Many project task forces, in fact, disband prematurely before the benefits are reached. Only when the entire project task force says, "yes, we are achieving the benefits," should the group be disbanded.

IS staff members and senior management on the project team should understand that off-the-shelf software still needs significant amounts of installation time and effort. Installation may require the full-time attention of one or more end users for several months. Although the time they spend will be compressed and amount to far less than that for completely customized software, this commitment is necessary to achieve the time benefits of package software discussed earlier. Also, the shorter implementation time cuts the learning curve from perhaps two years to six months.

> *Vendors that have a high integrity rating are likely to have a high installation success rate as well.*

The whole task force must feel a sense of ownership of the vendor package. One way to do this is by creating a project theme and logo that differs from the vendor's. This may mean changing the name of the package (from MAPS to IMPS, for example) or creating a cartoon character that is used in training videos and other collateral materials. These actions may sound frivolous, but they give the team a real sense of ownership and ultimately translate into a higher acceptance rate.

The importance of identifying and producing specifications for interfaces, conversions and procedures is often underestimated when installing package software. Usually the time required to perform these activities is carefully considered when custom software is under development. However, these and other company procedures tend to fall by the wayside when a package program is bought. It is important, therefore, to set aside sufficient meeting time for revalidating specifications. Upfront planning time may take longer than expected, so calculating a realistic time frame and holding to it tenaciously is mandatory for any package software installation strategy.

At this point in the installation, the end user verifies the usability and acceptability of the system. Don't use IS or the vendor to do this, because only the actual end users know what the results should be. There is also still time to work on the program and decide which errors, modifications and business issues need immediate fixing and which can be deferred to a later release. Allow up to 50 percent of the project's schedule for this testing/modification stage.

Senior management should also take this time to ask questions. Once they have their answers, they should physically sign off on the project. By signing a document, these managers say they understand the project and take responsibility for it.

Once an off-the-shelf package is installed, its value to the end user as well as to the entire organization must be communicated. Specifying the benefits allows the project to be personalized and shows that it is as valuable as in-house developed software. It is important to demonstrate to users that these kinds of packages are being installed not just to influence bottom-line results but also to help them do their jobs better.

Just as custom software installations use end-user product experts to provide peer-group training and on-going consulting, so should package programs. And it's just as important to generate enthusiasm for a vendor package as it is for a custom program, encouraging the whole organization to support the installation and to be proud to work for a company that is making such technological advances.

Ron McEvoy is a senior vice president and CIO of Ivey's department store in Charlotte, N.C.

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A Battle ROI-al

Some brave souls hold the view that measuring return on IS investments isn't necessary. The authors beg to differ . . .

BY DEAN MEYER AND MARY BOONE

PHOTO BY MICHAEL KRESSLEY/PHOTO COLORATURA

In a recent *CIO* article ("The ROI Polloi," April 1990), several interviewees advised IS executives not to use explicit cost/benefit analysis for investments in information systems. But reader beware: Heeding such advice may be hazardous to your career.

Imagine a meeting of a capital-budgets committee in a Fortune 500 company. What if every department claimed that their projects provided the firm with "competitive advantage?" We can just see it now: "Therefore, (insert the name of your favorite CEO), we believe we should be awarded our budget request because it gives us a competitive edge. We don't have any numbers for that, but we're sure you will agree." Unfortunately, many companies have bought into this argument when it comes to information systems, burying their heads in the sand to avoid the unquestionably knotty endeavor of determining systems' value to the organization.

This "ostrich" approach to the measurement issue is not only unhealthy for the firm; it may be political suicide for those who endorse it. CIOs may think that arm-waving about competitive advantage will gain them a blank check. It may for a while, but at a cost of executive resentment for being "held hostage." Eventually executives will demand proof that such advantage has really been achieved. If such proof is not forthcoming, they'll soon divert precious resources to other investment opportunities. In the end, rationality will prevail.

It's true that for many years IS departments have employed old industrial-engineering techniques to measure minutes of time saved and marginal reductions in administrative costs. If you are stuck with this sort of simplistic, traditional approach to benefits measurement, strategic opportunities will undoubtedly be missed.

But no other capital investment or strategic business activity is limited to these archaic metrics. Most business decisions involve financial analyses that estimate marginal contribution to profits. Certainly, the more strategic the activity, the less precise the measure; strategic decisions inevitably require a greater amount of executive judgment. But that is not an excuse for giving up and calling the significant benefits of such endeavors "intangible."

Consider the value of a sound measurement approach:

- A discipline of financial justification ensures a clear business focus on IS projects. If you can't approximate the value of a proposed system, you probably don't know what you're there to accomplish. IS must stop hiding behind the veil of technological necessity and become client-focused and business-driven.
- ROI is an equitable way to allocate limited resources in response to unlimited demand. Priorities should not be based solely on corporate politics or the opinion of IS managers. The rules of the game must be clear so that clients can be involved in the process.
- It is incumbent on the CIO to lift people's vision of what is possible, through believable success stories that demonstrate the strategic role of information systems. Clients throughout the company ultimately determine whether IS is used for mission-critical needs or traditional administrative tasks. If they don't understand why systems are strategic, they'll keep asking for administrative applications.

Salesmanship and political pressure may work for a while, but avoiding the measurement issue is avoiding the real challenge of building an organizationwide culture of strategic use of information systems. The CIO should not just think about building one or two strategic systems. A real leader will help to shape a culture that ensures a strategic focus forevermore. Measuring the so-called "intangibles" is one step in this process.

It's time to treat IS like any other capital investment. It's time for CIOs to step out of the bounds of old methods, and up to the challenge of measuring contribution to the bottom line. CIO

Dean Meyer is president and founder of NDMA Inc. in Ridgefield, Conn. Mary Boone is a partner of the firm. They are co-authors of The Information Edge, *in which they measure the ROI in over 60 case examples of strategic information systems.*

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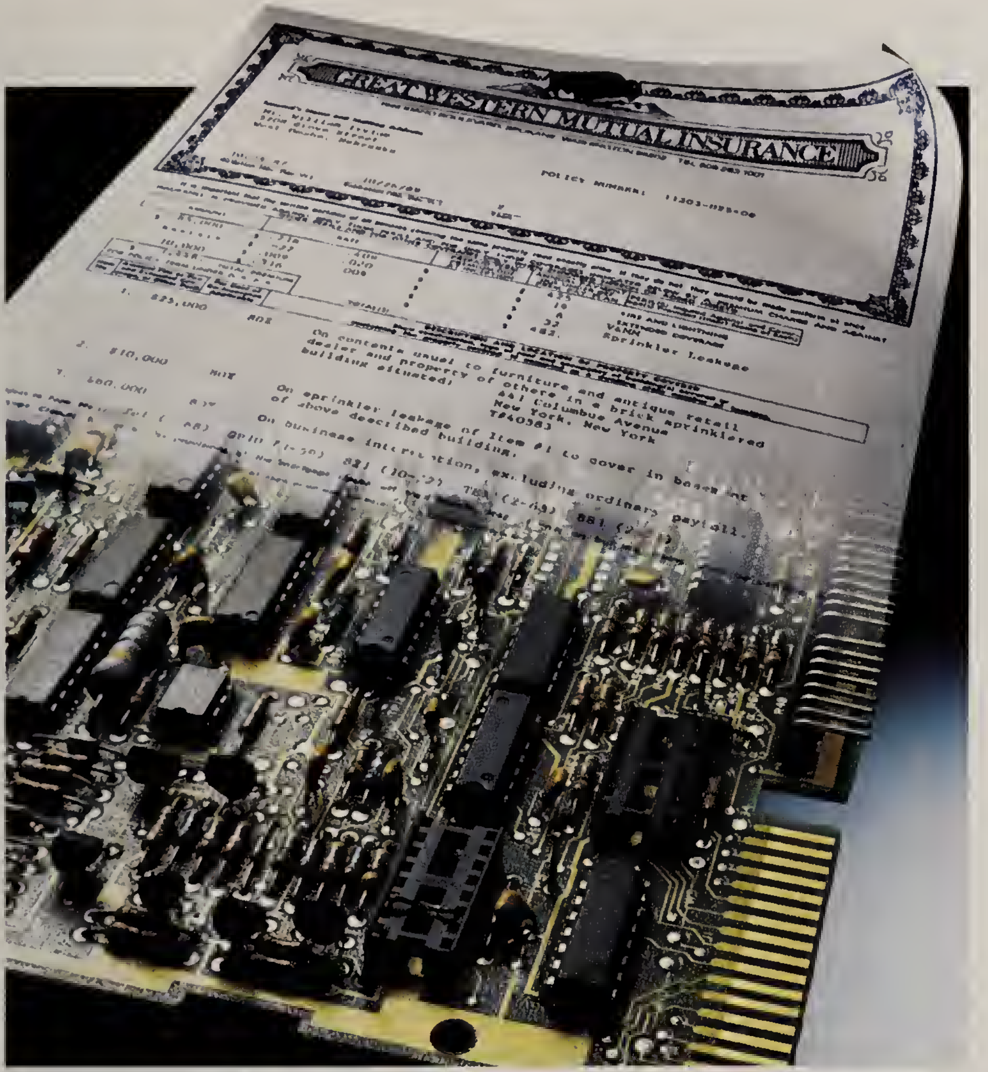

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IT'S SO HARD TO MEET NEW EDI PARTNERS

Matchmaking doesn't typically fall under the corporate banking umbrella, but First Interstate Bancorp of Los Angeles thinks some of its customers can benefit from a formal introduction.

The company recently announced a series of enhancements to be offered to customers of its ACTION Electronic Data Interchange (EDI) service who are interested in expanding their EDI activities. First Interstate will make available its large nationwide database of EDI users to help ACTION customers identify potential trading partners; the bank will then assist customers in signing the new partners up.

"Banks are now in a unique position to promote the use of electronic data interchange between clients and their trading partners," said Vice President and EDI Product Manager Robert Rosdorff. "Our program can help a high-volume company achieve its goal of adding key trading partners, and it can simplify the sign-up process for middle-market and smaller companies, creating value for all concerned parties."

As part of its expanded service, First Interstate will work with clients to develop a comprehensive approach to trading-partner sign-up and training that is tailored to the clients' corporate needs as well as to the varying EDI requirements of diverse industries.

According to Randy Kahn, manager of First Interstate's Electronic Service Business Unit, the bank's broad experience of EDI has been captured in a database, categorized by industry, and incorporated into a series of training packages.

Rosdorff believes that First Interstate's broad geographic reach (the bank has 1,200 full-service offices in 21 states) ideally suits it to the task. "First Interstate's unique, multistate franchise can be integral to a company's successful financial EDI rollout. Progressing beyond the pilot stage is very difficult without on-site assistance by capable consultants familiar with the client's industry."

To that end, First Interstate has spent the last eight months providing industry-specific EDI training to service, product and operational staff at its affiliate banks; they in turn will offer EDI consulting and project-management services to clients across the country.

The First Nationwide EDI enhancements are provided at no additional charge to customers of the ACTION EDI service. ■

ILLUSTRATION BY JULIA TALCOTT; PHOTO COURTESY OF DIMENSIONAL FOODS CORP

THE FEE-ENTERPRISE SYSTEM?

The engine of free enterprise is inventiveness, right? Well, according to a recent *New York Times* article, an overabundance of inventiveness has become the scourge of the food business as supermarkets struggle to cope with a glut of new products. More than 12,000 were introduced last year alone; of those new items, more than 9,600 failed to convince consumers that they couldn't be lived without. The penalty to retailers is deadwood taking up valuable shelf space and trimming already-thin profit margins.

Retailers and wholesalers say they have little to gain from many new products that manufacturers regard as potentially profitable marketing gambits—so-called line extensions.

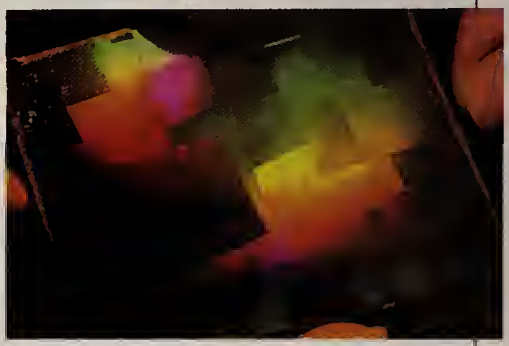
One solution proposed by some powerful grocery wholesalers is a "failure fee" to be levied against the makers of dud products. The *Times* piece quoted James L. Baska, president of Associated Wholesale Grocers Inc. of Kansas City, Kan., as saying that distributors will "increasingly insist that the costs of failed products are borne by the manufacturer."

The talk of failure fees evokes manufacturers' fears of stifled innovation. But grocers accuse manufacturers of saving the cost of market research by using store shelves to test-fly products that serve no genuine consumer need. The cost of such testing, distributors argue, is disproportionately borne by them and by the supermarkets.

The *Times* article, by Eben Shapiro, noted that some manufacturers are taking the threat of fees seriously. Shapiro quoted from a recent speech by General Mills Vice Chairman Arthur R. Schulze, who opined that it "may no longer be appropriate or desirable . . . to introduce the 35th line extension of pound cake." ■

FOOD FOR THOUGHT

MORE THAN YOU CAN CHEW



IS A PICTURE *worth a thousand calories? If it's made of chocolate, yes.*

Neal S. Winneg wants every kid in America to play with his food. As executive vice president of Dimensional Foods Corp. in Boston, Winneg is betting that his company's new edible hologram technology will become the greatest food-industry phenomenon since NutraSweet. Aiming primarily at the child-oriented candy, cookie and cereal markets, Winneg predicts that "holographic food will be as entertaining as toys."

The two-year-old R&D start-up was founded by Eric

TRENDLINES

Begleiter, an optics enthusiast who developed and patented the process of embossing three-dimensional images directly onto the surface of food without using dyes or chemicals. The edible holograms are created by molding a layer of microscopic ridges entirely out of the food ingredients. Light diffracted by the ridges creates the colorful holographic images, which appear to shimmer and move. And because the ridges are made of the ingredients themselves, the texture and taste of the food are not affected.

According to Winneg, the technology for mass-producing edible holograms can easily be incorporated into the manufacturing process, and he estimates that the additional cost per unit "will be very inexpensive.

"Basically, holograms are just an alternative means of decorating food," said Winneg. In addition to the embossed images, Dimensional Foods has also developed "Rainbow Sparkles"—holographic sprinkles made of starch that can be applied to food just like conventional sprinkles.

At the moment, Dimensional Foods is engaged in confidential negotiations with several major food manufacturers who are "very positive about the [product's] potential," said Winneg, who hopes to see edible holograms on the market by 1991. For the immediate future, the company plans only to license the technology to manufacturers, but Winneg eventually sees Dimensional Foods producing its own line of candies.

If edible holograms catch on with kids, Winneg sees no end to their potential applications. "We're developing holograms for pharmaceuticals—to differentiate brand-names from generics and protect against counterfeits," he said.

So much for mothers admonishing kids to stop playing with their food and take their vitamins. ■

FEEDBACK

The flip side of food retailers' complaints that they're drowning in new products are the complaints of manufacturers that they're drowning in data about their products' performance.

A recent study by Temple, Barker & Sloane Inc., a research and consulting firm in Lexington, Mass., suggests that manufacturers aren't yet ready to declare scanner data the great success they hoped it would be. Executives at 51 companies surveyed by TBS, each of which spends an average of $1 million a year on scanner data, say they have yet to see the anticipated benefits.

The chief cause of companies' frustrations, the study found, was a dearth of analytical tools. "Executives are basically happy with the completeness and timeliness of the data they receive," said Nancy Peck-Gray, a TBS associate who helped conduct the survey. "But they are less satisfied with the application support they receive [from data suppliers]." ■

TELECOMMUNICATIONS

ONLY A PHONE CALL AWAY

A recent survey conducted by Andersen Consulting reveals that large numbers of telephone company business customers want to reach in and touch telco information systems.

The survey of 250 top customers of U.S. telephone companies shows that approximately 80 percent of respondents would like the ability to access internal phone company systems for such purposes as previewing their bills, ordering or discontinuing service, logging comments on system problems and initiating line tests.

According to the survey, most customers expect some degree of customer access to be provided as a standard service. However, one-third to one-half of the respondents indicated a willingness to devote as much as 5 percent of their telecom budgets to paying for such services as billing inquiry, network operations management and receiving help with telecom service planning.

As in other highly competitive industries, customers are in a position to be demanding. Respondents told Andersen they would likely select a telephone service provider on the basis of added value.

Said Alan A. Burgess, worldwide managing partner in Andersen's Telecom Industry Group, "One of the major telecommunications trends of the 1990s will be the shift from a primarily technology-driven industry to one that is market-driven. . . . Telcos that can radically improve customer service are going to have a sharp edge." ■

AND FURTHERMORE . . .

Information that was the basis of a chart on value-added network vendors, which ran on Page 100 in the May issue of *CIO*, inadvertently omitted some VANs of note. Western Union Corp. of Upper Saddle River, N.J., offers EasyLink, a data network providing E-mail, dial backup, databases, protocol conversion, EDI, facsimile, telex, binary file support, PC support, error correction, automatic message confirmation and high-volume capacity.

In addition, Datapro Research of Delran, N.J., the source of the chart information, has updated its VAN listings to include ADP Autonet, a data network offering E-mail, dial backup, error correction and PC support; an offering from Cylix Communications Corp. that provides dial backup, disaster recovery and error correction; the Graphnet Freedom Network, which features EDI, E-mail, fax, dial backup, PC support, databases, automatic rerouting, integrated packet switching, circuit switching and digital multiplexing; Telecom Canada's Datapac, a data network available in 200 Canadian cities; and WangPac, which offers dial backup, data connect services, PC support, EDI, E-mail, application services, databases and imaging. ■

ILLUSTRATION BY JULIA TALCOTT

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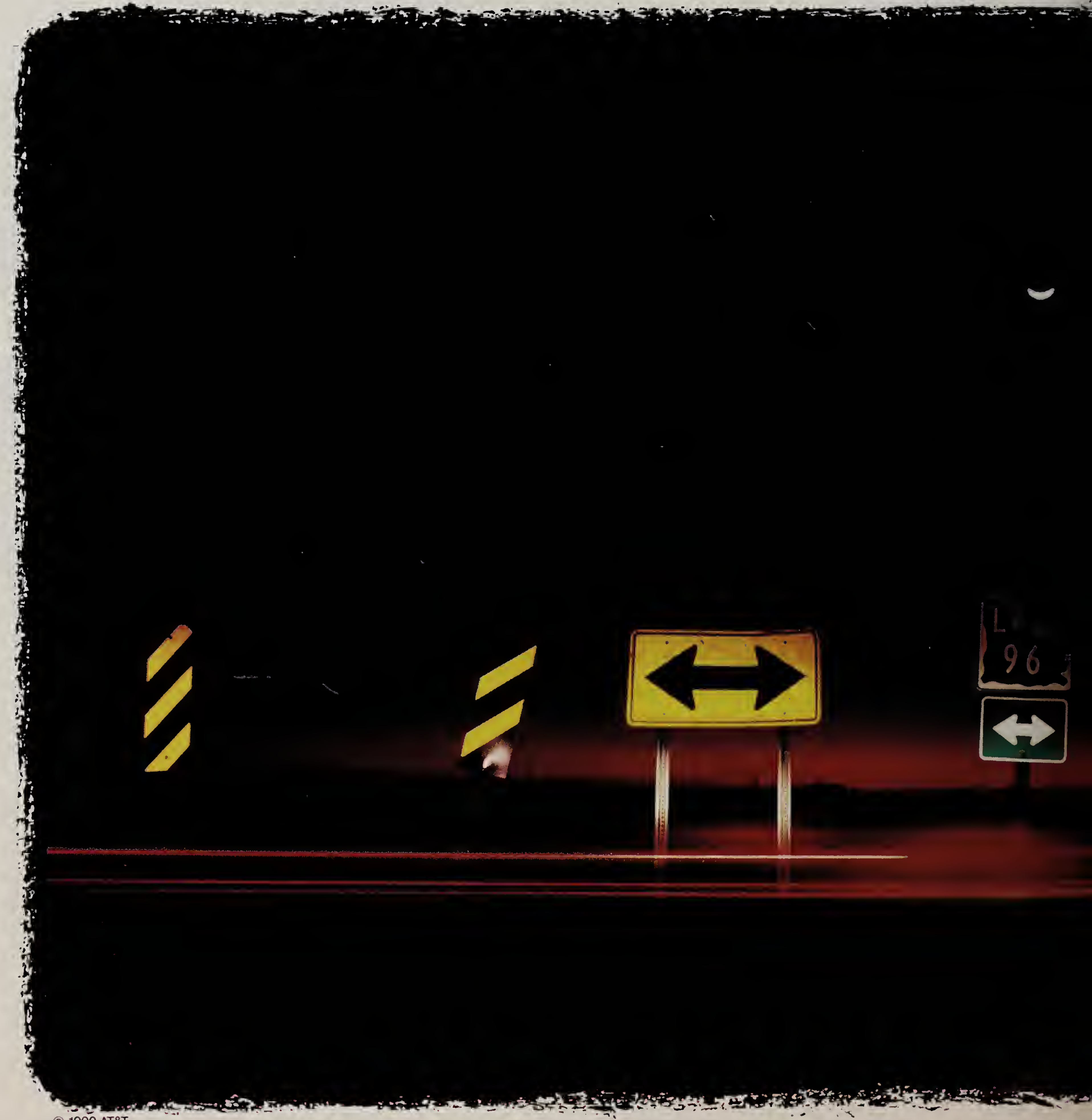

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If yes, which carrier? ____________________

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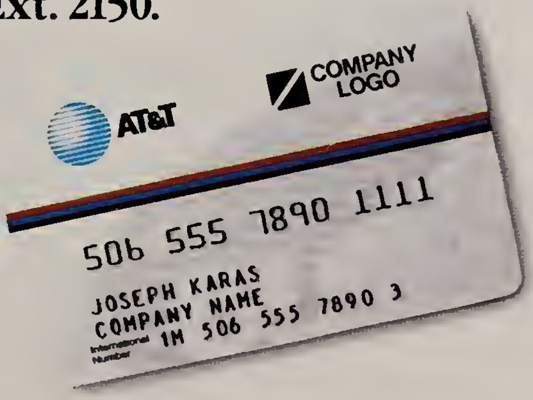

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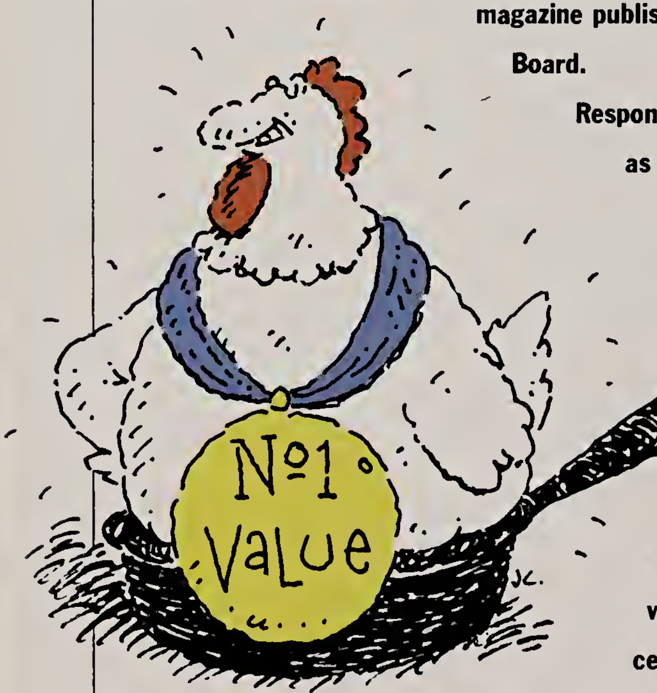
TRENDLINES

IN CHICKEN WE TRUST

According to a nationwide household survey, chicken delivers good value for the money. Hospitals and lawyers don't.

The survey of 7,000 families was conducted for The Conference Board, a New York-based business research organization, by National Family Opinion Inc. Findings appeared in the June issue of *Across the Board*, a magazine published by The Conference Board.



Respondents were asked to rate as "good," "average" or "poor" the value received from 50 different products in a range of categories.

Poultry nosed out videotape rentals, TV sets, appliances, and fruits and vegetables for highest perceived value. Also highly valued were meats, pet food, haircuts, fish, electricity, restaurant meals and telephone service.

Consumer scorn was heaped (in descending order of disfavor) upon hospital, attorney and credit-card fees; cable TV "premium" services; health insurance; movie admissions; sports events; auto insurance; bank service charges; used cars; doctors' fees (a medical double dip!); and college tuition.

What does all this mean? Well, we're not sure. But when good old St. Elsewhere charges you $17 for two aspirins and the local Piggly-Wiggly charges you $6.86 for a 12-piece family pack of chicken legs, only one of these deals is likely to resemble a bargain. ■

GAMES PEOPLE PLAY

BETTING ON THE NETWORK

ILLUSTRATION BY JIM CARSON

Aside from bank ATMs, the technology interface that people are most likely to encounter on a daily basis may be the lottery terminal in the local convenience store. States with lotteries and related games don't want to gamble on network reliability and integrity, so the emphasis on zero-defects performance is high.

Increasingly, the job of assuring system reliability falls to network vendors, who operate the systems for state lottery agencies. And perhaps no other networking application is more highly regulated by states or as subject to stiff fines for failing—from $1,000 to $5,000 per downtime minute levied against vendors by lottery managers.

One of the largest players in the government gaming game is a Rhode Island firm called GTECH Corp., which boasts 41 online lottery installations worldwide, including systems in such far-flung outposts as Ireland, Spain, Singapore and Kuala Lumpur, as well as in California, Indiana, Ohio, Kentucky and Colorado. GTECH is the leading U.S. provider of turnkey lottery systems. The networks incorporate high-speed connectivity systems from Timeplex Inc., of Woodcliff Lake, N.J.

Lottery networks have to be as fast as they are reliable. They must also accommodate widely fluctuating traffic, which tends to clump into the hours leading up to a drawing. According to Don Stanford, GTECH's senior vice president for technology, 80 percent of the tickets are purchased in the final 20 percent of time.

A recent late-breaking Lotto feeding frenzy in Ohio produced a $32 million jackpot on the strength of $2 million in hourly sales from 3,495 statewide terminals linked to a mainframe in Cleveland. A typical transaction—having the number keyed in at the retail location, sent over T1 lines to the mainframe and returned as a ticket—takes from two to four seconds.

Networked lottery terminals may eventually dwarf bank ATM inventories—if they don't already: California's lottery now pumps tickets through 8,150 terminals, with expansion capabilities up to 24,000. Soon enough, playing a state-run numbers game will be as easy as going to the refrigerator. ■

CAREER MOVES

MIKE LITTLE has been named vice president of IS for Boeing Computer Services. Little will oversee all external business activities of BCS, a systems integrator and computing and telecom facilities-management company serving government and private-sector clients. Little, who has been with Boeing since 1977, joined BCS in 1988 and has been deputy general manager of IS for the past year and a half. He replaces Orv Langdahl, who retires this month.

BusinessLand Inc., a microcomputer distributor and integrator based in San Jose, Calif., has named L. PETER (PETE) BATES its new vice president for information services. Bates, whose career in IS has spanned 30 years, joins BusinessLand from Raychem Corp. (Menlo Park, Calif.), where he has worked for 17 years, most recently as manager for information technology systems and planning. Bates will report to BusinessLand Senior VP for Product Operations Douglas C. Johnston.

EDWARD D. WILLIAMS has been appointed managing director of the Business Information Systems Division of Science Management Corp. in Basking Ridge, N.J. In his new position, Williams is responsible for the development and growth of SMC's programming consulting business. Most recently, Williams served as a senior consultant to the chairman of SMC. In the past he has been a vice president/CIO at both Blue Cross/Blue Shield of New Jersey and the American Broadcasting Companies. ■

Due to a software error at the credit card company, the power lunch is now in hot water

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I Survived Outsourcing

It's not easy beginning again from scratch, but the result is to put IS control, responsiveness and initiative back where they belong

BY DONALD BLAIR

I was the CIO at a company that outsourced its information systems operations to a third party. Despite the fact that the data-processing services vendor to whom we outsourced was and still is considered one of the best, the only truly positive thing I can say about the experience is that the process of disentangling ourselves from the agreement went more smoothly than it might have. Until recently, this experience seemed more or less in line with the conventional wisdom about third-party IS arrangements. Now, suddenly, every vendor is a "systems integrator" eager to take over various pieces of its customers' IS efforts—and customers are giving it serious consideration.

I can't fault vendors; they're just jumping at an opportunity. But I'm amazed so many companies that should know better have outsourced or are on the verge of doing so, while the rest of the business world is talking the concept up. Maybe it's just the good old bandwagon phenomenon, which has been responsible for so many other misguided business trends. It certainly can't be emerging from a thoughtful and farsighted analysis of the costs and benefits, nor from a careful examination of the experiences others have had with outsourcing.

The greatest justification cited for outsourcing is cost savings. Some CIOs say, "How can we be expected to build and utilize complex IS resources as cost-effectively as an information-services vendor could, when that's what their business is all about?" That's a seriously mistaken way to look at the issues. Increasingly, everyone is in the IS business, whether they like it or not. For companies in finance and other industries, information *is* the product. Even at manufacturing companies, data represents a growing part of the product in that it drives every aspect of production and of servicing the customer. If you can't manage the costs associated with such a crucial part of your business, you're in more trouble than a so-called systems integrator can get you out of.

Let me illustrate this fundamental point with the story of my experience with outsourcing.

In the late 1970s I joined one of the largest bank holding companies in Texas, just a few years after the company had outsourced its information systems to a leading IS facilities-management company. It soon became apparent to me that our IS capabilities were lagging under this arrangement, and in 1981, with the chairman's blessing, I brought in an IS consulting company to help me re-

ALL IS FORGIVEN-- PLEASE COME BACK!

ILLUSTRATION BY STEVE VANCE

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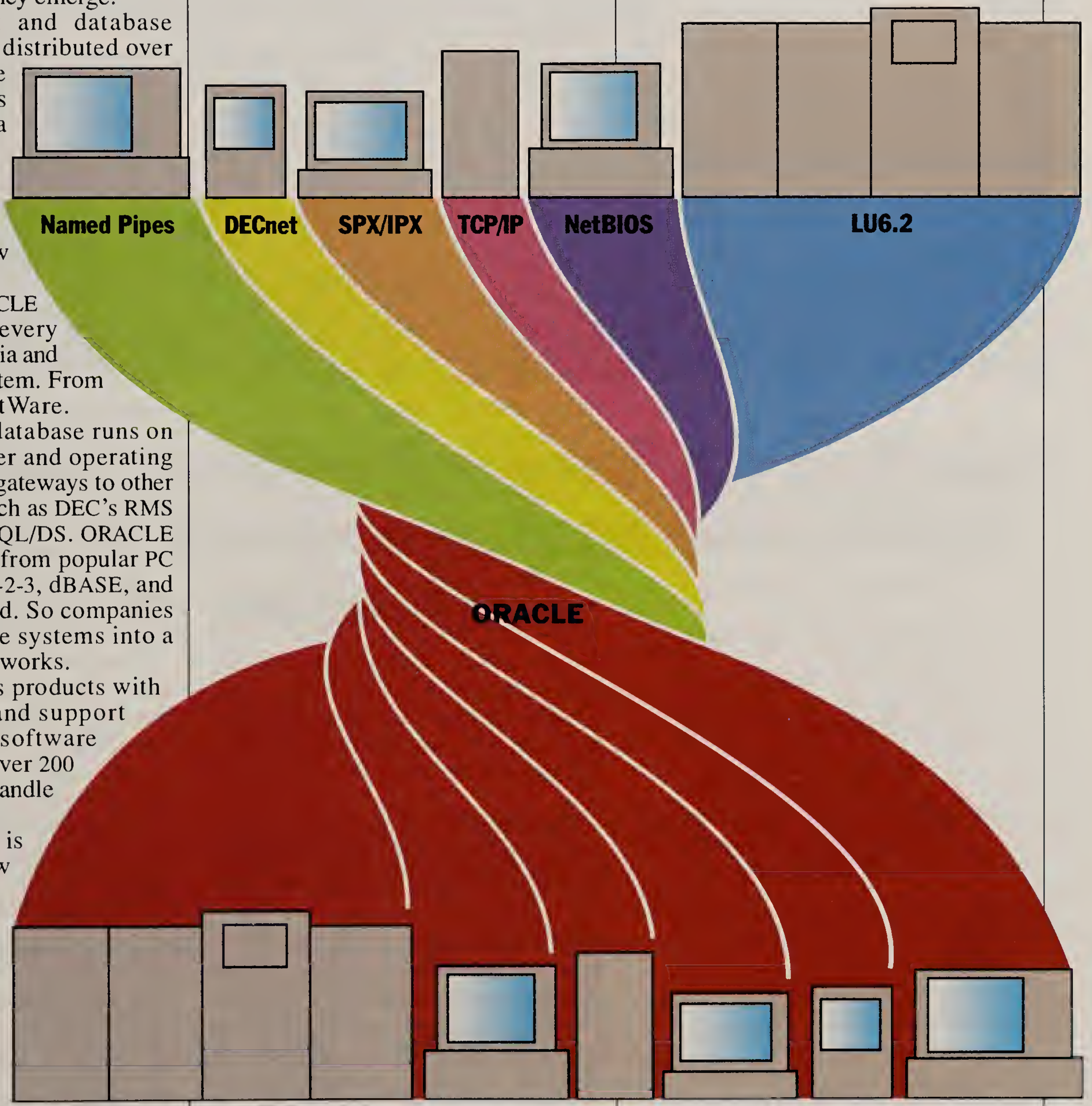

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assess the situation.

At the time, we were paying $11 million a year to the facilities-management company, and given our rapidly growing needs, we projected that we would be paying $28 million a year by 1988.

Meanwhile, in the several years this company had been managing our information systems, not a single one of our 13 banks had been brought fully online to the software on which we had standardized. Moreover, there were no projections whatsoever from this company on when we might expect to be able to migrate our banks to the new, much-enhanced generation of software that had been promised in the contract.

The obvious conclusion was to negotiate an early out with the third party and bring our information systems in-house. But we had virtually no IS capabilities at the time; if we were going to develop an IS operation for 13 banks, we were going to have to build it from scratch.

If you can't manage the costs associated with IS—such a crucial part of your business—you're in more trouble than a so-called systems integrator can get you out of.

In addition, we realized we would have to run our new operations in parallel with the third party for at least two years to give us a chance to get up to speed and allow for a seamless transfer. Thus we projected that our costs would shoot up in the short term, as our start-up costs were added to the costs of maintaining the third-party operations. But we also calculated that our costs would quickly stabilize as we phased out the third party and got past the expensive start-up stage.

That's exactly what happened. In 1983 our data center came online, at a cost of $8 million. Meanwhile, our third-party costs had risen to $13 million that year (as we had projected), resulting in a total expenditure of $21 million. But in 1986, by which time we had phased out the third party, our total IS costs had remained at only $21 million—$2 million less than we had projected we would have been spending on third-party operations. By 1988 our annual expenditures had risen only another $2 million to $23 million, or $5 million less than we would have been spending on the third party. And our IS requirements had increased even faster than we had projected.

Did we make sacrifices to achieve these savings? Quite the contrary. During these years we acquired 20 additional banks, for a total of 33, and we provided information services for all of them.

Between 1983 and 1986 we doubled the number of "service units" we were supplying (a service unit is a single application to a single bank). We upgraded our data center during these years from a bare-bones unit in a parking garage to a first-class facility, and we boosted our mainframe horsepower by more than a factor of 10.

We converted all our banks from a hodge-podge of outdated applications to a state-of-the-art integrated banking system. We designed and implemented our first comprehensive disaster-recovery plan and tested it by simultaneously bringing up 12 banks at our backup site over 1,000 miles away. We installed a completely redundant backbone communications network that looped through the entire state. And we accomplished all of this at substantially lower cost than we would have incurred under our third-party arrangement—even though we wouldn't have realized most of these improvements through the auspices of the vendor.

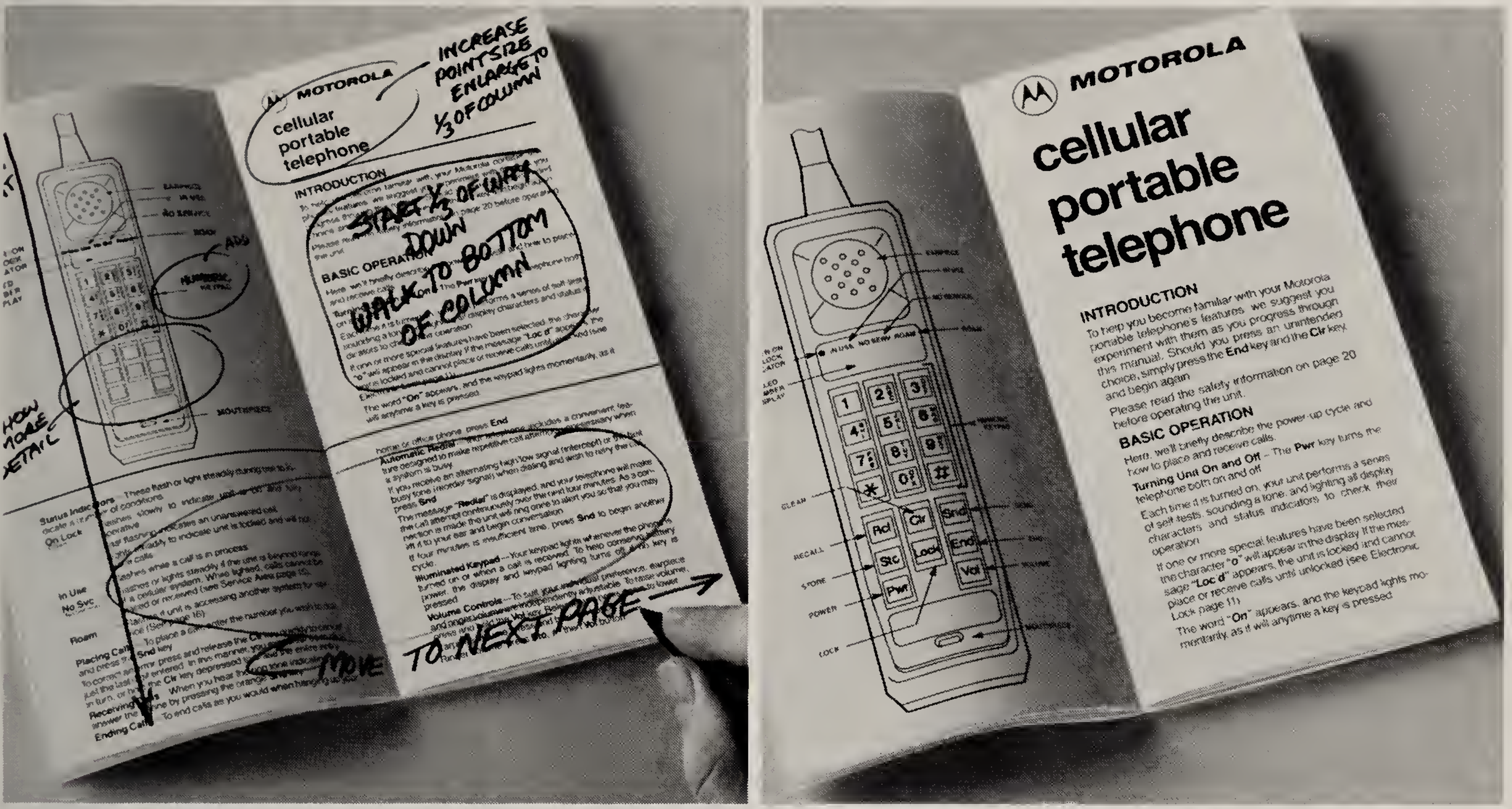
What was our secret? Simple cost-management techniques. And that doesn't mean reducing staff to a bare minimum and trying to beat as much as possible out of everyone that's left. It means giving everyone in IS the motivation and the tools for getting more out of less. To provide the motivation, we made achieving cost-effective operations—in concert with turning out a high-quality product—a top goal in our department. We posted our budgets and expenses on the walls of our offices and made sure successes in trimming costs were recognized and rewarded.

A third-party vendor's goal is to maximize their profits, not to cut your costs or improve your quality.

As for tools, we realized that you can't fix something if you can't measure it. So we installed various types of hardware and software performance measuring tools and implemented procedures for optimizing all our resources. We tweaked and staggered resource-hungry applications to avoid unnecessary upgrades; we automatically nuked files that hadn't been active for 60 days (unless an exception was requested), freeing up data storage; we implemented software-development methodologies to reduce the chances of projects running out of control.

Frankly, I don't think there's an IS shop in the country that couldn't employ these and similar techniques to reduce costs. When I came last year to my present job at Perpetual Savings Bank (not the organization profiled in this column), the company was about to upgrade its mainframe. The first thing I did was

XEROX



Motorola wrote the book on cellular phones. A Xerox system lets them rewrite it in minutes.

Motorola is the world's largest producer of cellular phones. Not to mention cellular phone manuals. For which they turn to a company called Rich Graphics.

But when Motorola decided they wanted to be able to revise and reprint their manuals on a "just-in-time" production schedule, Rich Graphics turned to Xerox.

Working with Rich Graphics, Xerox developed a solution that integrated both hardware and software, Xerox products and other suppliers' products. And the resulting phone manual production is something to talk about—to say the least.

The manuals are now printed on Xerox laser printers just minutes after the revisions flash across the screen of a Xerox workstation. Turnaround time is 80% faster. Costs are down 50%. And the documents produced are 99.99966% perfect.

Of course, Motorola isn't the only client that Rich Graphics uses Xerox for. And the resulting improvement in customer satisfaction has helped Rich Graphics *double* their printing business every year since they came to Xerox.

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install a four-color plotter so we could make easy-to-read charts of which applications were eating up how much power. With a few months of tuning, we had reduced the strain on the mainframe to the point that now, a year later, we still have no plans to carry out the upgrade. That step alone has saved us $2.6 million.

Would a third party have gone to this trouble to save us that money? Probably not. Their goal is to maximize their profits, not to cut your costs or improve your quality. They have many other customers to worry about, and they have to give the greatest consideration to their big picture—not your individual situation. They certainly don't have to worry about any contractual obligation for providing you with cost-effective service, given the kind of fuzzy agreements most companies sign when they outsource.

I'll never forget the time that our vendor told us that a clause in our contract stating that six to 12 contract programmers were available to help us with application development meant that we had to pay for at least six extra programmers, whether we wanted them or not.

"All this may be true," some CIOs will argue, "but where are we supposed to find the talented and experienced people necessary to run a first-rate IS operation? Besides, who cares if it's a little cheaper to run the data center in-house? What really count are strategic applications, and pushing the data center outside allows us big thinkers to concentrate on this far-more-important aspect of information technology."

That reasoning doesn't hold water. The difficulty in finding good people doesn't result from a shortage of good people; it results from many managers' inability to recognize good people when they walk in the door, and from not knowing how to get the most of out of these people when you're lucky enough to grab them.

The focus on strategic applications is also a smokescreen. All strategic applications represent a twist on a more basic, "tactical" system. The great textbook strategic systems, such as American Airlines' SABRE and American Hospital Supply's ASAP order-entry system, resulted from a surprise wrinkle in what was supposed to be a straightforward application. Here at Perpetual, we've developed a competitive edge through our home-telephone banking, but this application relies heavily on basic systems. And at the core of all such basic applications is the data center. As far as I'm concerned, the data center is one of the most strategic things going at the company. If it went down, I'd drop everything; we'd be out of business until it went up again. And yet people talk about outsourcing the data center as if it were an irritating detail.

> *The difficulty in finding good people doesn't result from a shortage of good people; it results from many managers' inability to recognize good people when they walk in the door, and from not knowing how to get the most of out of these people when you're lucky enough to grab them.*

So while there really is very little to be gained through outsourcing, something critical is being given up: control. Outsourcing can seriously limit your ability to react to a crisis or opportunity that could be addressed by information technology. If your company were suddenly losing market share to a competitor's IT-based edge, you'd want to pull all the stops out in responding. Can you be sure your third party would do the same?

Suppose the perceived reliability of your network were crucial to your image among customers. Can you expect a third party to share your horror of even brief interruptions in network operations, when they have dozens of other customers whose requirements might demand occasionally pulling the plug?

At a time when IT is more crucial than ever to most companies, relinquishing control at this stage strikes me as no less than suicidal.

Why is outsourcing picking up steam anyway? Ironically, I think it's in large part tied into one of the great trends in IS management: the effort to put into place IS executives who have business as well as technical expertise. It has been a crucial step—one that has made possible the entire wave of strategic IS—and it has literally transformed business.

But now we're seeing the trend carried to its extreme, in the form of the myth of the non-technical CIO. Apparently, businesses believe that because adding business expertise to technical expertise has worked so well, they'll get even better results by having someone with exclusively business expertise run IS.

This is a huge mistake. CIOs without technical insight have little appreciation for the opportunities and risks related to the data center and basic systems. It's only natural that these non-technical CIOs reach for outsourcing: They're just getting rid of what they understand least.

But outsourcing will come back to haunt most companies that follow this course. It may take a well-publicized disaster to get people to catch on. But that probably won't be long in coming. CIO

Donald Blair is executive vice president and CIO of Perpetual Savings Bank, based in Arlington, Va.

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LEGENT

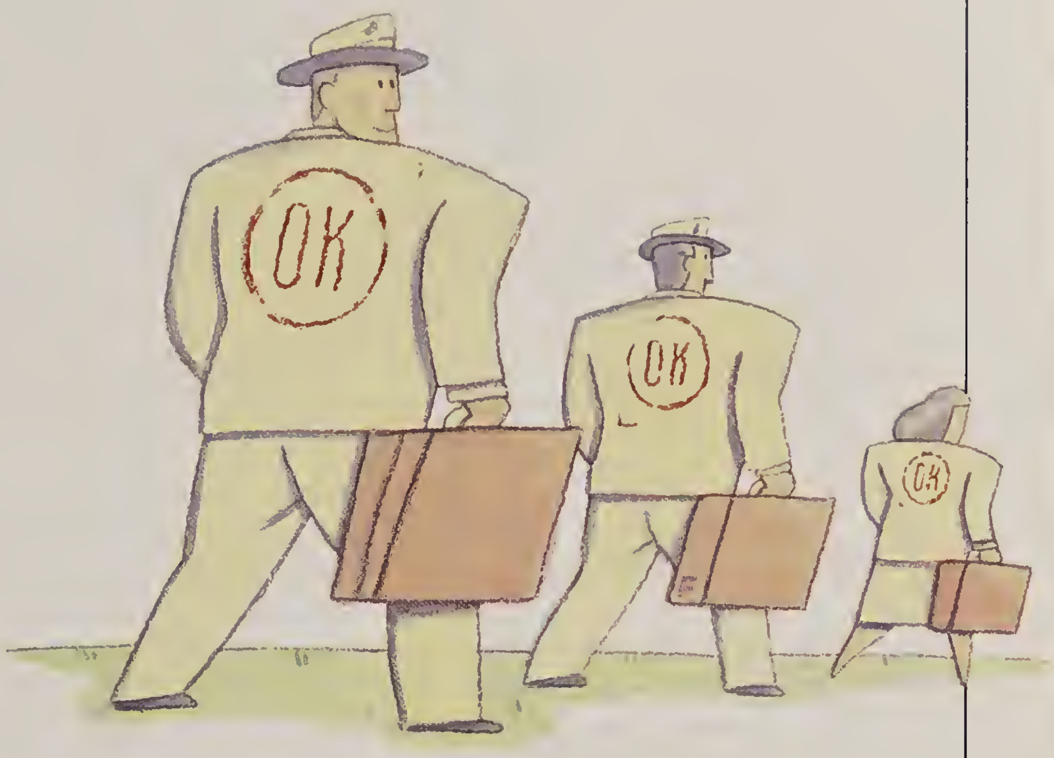
THE RIGHT STUFF

Quality today means more than just turning out a good product; it connotes a commitment to excellence throughout the organization

BY PAUL KONSTADT

A revolution in the way American business managers approach their markets has given new meaning to the old advertising slogan, "quality is built in, not added on."

In earlier, simpler times, improving manufacturing quality meant simply looking more closely for defects, then fixing them before the finished product left the factory. Today quality has become a code word not for mere inspection and repair, but for changing



the focus of the enterprise. In the contemporary lexicon, a business is not merely a producer of goods or provider of services; it is a satisfier of customers' needs and desires. For companies to be successful under the new ground rules, employees' attitudes may have to be changed substantially.

"We achieved quality not through a separate program, but through fundamental changes in the way our company was managed," said W. Kent Sterett, who was director of quality for Florida Power & Light last fall when the company became the first non-Japanese organization ever to win the Deming Prize—Japan's most coveted award for quality—which is given by the Japanese Union of Scientists and Engineers.

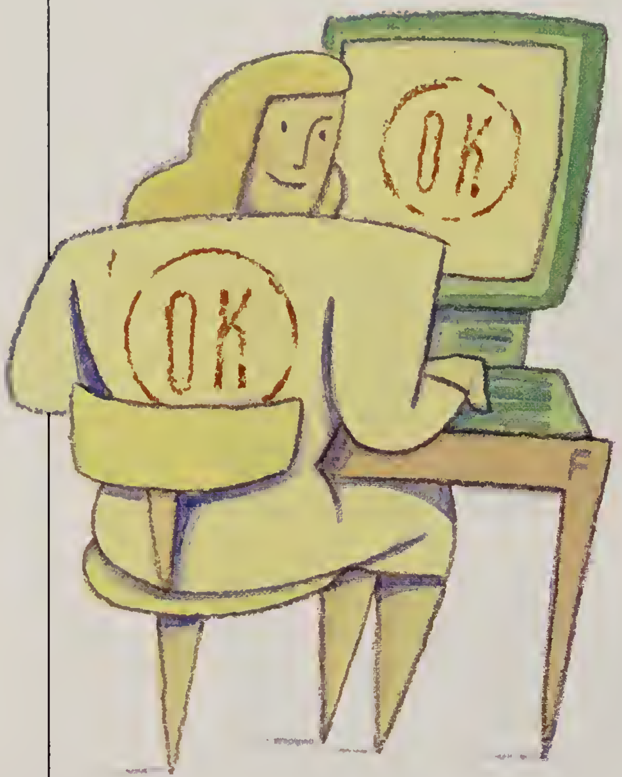
Much of FP&L's management improvement was supported by the creative use of advanced information management systems—to help diagnose the causes of blackouts, to monitor the maintenance needs of generating stations, and to coordinate the efforts of field installers. As a result, plant downtime and the average duration of blackouts have been reduced to industry lows, while FP&L's customer complaint rate has shriveled.

"You need a fanatic to drive the process, but two of them are going to kill you," said Jack Fooks, vice president of corporate productivity and quality for Westinghouse Electric Corp., whose nuclear fuels division (which makes fuel rods) is one of only five organizations to have won the prestigious Malcolm Baldrige National Quality Award, America's counterpart of the Deming. Fooks' title may reflect the degree to which the quality drive is integrated into the mainstream at Westinghouse, but his wry sense of humor reflects the tensions that still exist. "We were fortunate to have [only] one [fanatic]—company chairman John Marous."

Marous set a strong, quality-oriented tone from the corporate top—establishing a companywide quality competition, emphasizing quality achievements in management critiques, and subjecting his own office to quality review. But Westinghouse's improvement process, too, has strong IT underpinnings: Expert systems provide decision support for manufacturing machine operators on the factory floor; advanced test and measurement devices monitor every step of the production process, and powerful number-crunchers generate precise process-control statistics.

Companies like FP&L and Westinghouse have earned their featured spots in the center ring for effective, well-honed total quality efforts. But, say experts who study quality and advise organizations on attain-

ILLUSTRATIONS BY MARK FISHER



ing it, such efforts are rare, and there may be more grounds to predict failure than to expect success for any given company's quality-improvement campaign.

The roots of that bleak outlook are often deeply embedded in ancient functional rivalries, but information technology can be a liberating factor if it is an integral part of day-to-day business life and includes a well-orchestrated plan involving all key players.

"Information [pertaining to quality] is widely dispersed [and] not easily accessible by other parties that might find it useful," said Charles Fine, associate professor of management science at MIT's Sloan School of Management. "Field service data, for example, ought to be fed back to manufacturing and design, but we rarely see that." Fine cited the example of an electronics company studied by one of his students. The company had 20 separate information systems, each containing important data on the quality of the firm's products and services. Each was also incapable of sharing that data with the other systems. "I thought, 'My God, what a mess,' " Fine recalled. "No one was able to see the big picture."

But simply channeling diverse information streams into a single place is not the whole solution, say the engineers and quality managers looking at information systems output. "We probably have more information than we currently need," said John D. Rent, manager of production control and rolling at Lukens Steel Co. of Coatesville, Pa. "We've got so much information that we run the risk of people working on too many things at the same time, and of not being focused on the proper priorities for quality improvement." William Cronk, assistant director of quality at Caterpillar Inc. in Peoria, Ill., agreed: "Technology can provide an awful lot of stuff a guy can't use."

While enterprisewide IT systems have the capacity to reduce an incomprehensible flood of information to a more manageable trickle, company culture and politics often work against the necessary cooperation, according to Laurence Chait, a director in the information and telecommunications practice for Arthur D. Little Inc., a consulting and research firm in Cambridge, Mass. Chait's experiences with large corporations taught him that they are often "much like feudal societies, where kings and barons sit around the round table, talk about lofty things, pledge fealty, think maybe they are communicating, then go off and do their own thing."

If hierarchy and turf issues are allowed to dominate, said Chait, they can frustrate efforts to improve quality. "That's one of the reasons that a lot of organizations have sort of blown themselves up."

To avoid self-destruction, Chait advises his clients "to understand the role of technology the way they understand the role of marketing and production," knowing that no responsible executive would willingly hobble vital basic corporate functions.

Chait offered a paradigm for how well things can work when top corporate leaders commit themselves to a coordinated quality-improvement program and invest heavily in advanced information technology to support it: Shaw's Supermarkets Inc., a 60-store chain serving Central and Northern New England from its home base in East Bridgewater, Mass.

Using bar-code scanners at each checkout line, Shaw's computers identify and record each item sold. This information is used to automatically calculate customers' bills and track in-store and warehouse inventories. The system reorders depleted items, schedules work hours for operating staff, and pays bills—all with an internally developed integrated network of on-site PCs and minicomputers that are linked by dedicated lines to an NCR-equipped corporate data center. The system, which is widely regarded as one of the most advanced in the industry (Shaw's was cited in last year's CIO-100 issue on IT excellence and has been honored for its IT program by the Food Marketing Institute), cuts personnel and inventory costs and assures some of the best-stocked supermarket shelves in the region. That gives Shaw's a strategic advantage in a business where low price and high product availability are two of the principal yardsticks by which consumers judge quality, and where there is always a competitor in the immediate neighborhood.

> *"You need a fanatic to drive the process, but two of them are going to kill you."*
>
> *–Jack Fooks*

"Customers do their talking with their feet," explained Cliff Gardner, the company's senior vice president of information and technical services. "Once you've lost a customer, it costs hundreds of dollars to get him back."

In addition to the strategic benefits

of computer-integrated retail management, Shaw's has reaped a substantial financial reward for its IT investment. Accurate inventory tracking and automated reordering have combined to allow Shaw's to cut total inventory by more than 25 percent compared to a year ago, Gardner estimated, while point-of-sale scanning, backed up by an accurate price database, has increased checkout productivity by 20 percent, saving $300 to $400 in checkout-line labor per week at each store.

Point-of-sale data recording has been perfected to the point where 97 percent of all items passing through the checkout line are scanned, and the real-time inventory tallies kept by the in-store network are 87 percent correct—double the accuracy of seven years ago, and good enough to replace most manual inventory work.

Shaw's pays its customers a $2 bounty for each scanning error they spot in their transaction. The award has a double-edged use in the quality drive, Gardner said: It increases the public's confidence in Shaw's, and it enlists shoppers in the process of auditing the integrity of the database by having them watch more closely to be sure each item is scanned correctly.

For retailers like Shaw's, quality and customer satisfaction have long been seen as related, even interdependent. But in the manufacturing sector, the pursuit of quality has more often involved an inspection-and-repair process geared toward finding faults, then fixing them. Customer satisfaction has been considered a secondary goal, something taken care of well after the product has left the factory gate. But the quality revolution has changed all that.

Now instead of quality-assurance efforts to make a product meet engineering specifications, avant-garde manufacturing engineers speak of "total quality," defined as customer satisfaction with the end result. "The total quality concept is so simple that it's very powerful, yet a lot of manufacturing companies are overlooking it," said Lukens Steel's Rent, who has reorganized the way his firm manufactures the heavy steel plates sold to shipbuilders, boiler-makers and other industrial consumers.

Instead of seeing themselves all as members of one large team, Rent has asked the production groups at each stage of the manufacturing process to consider themselves separate entities. They've become businesses with the power to demand satisfaction from those who are upstream on the production line. Conversely, they must satisfy those who are downstream. This process effectively engages everyone in the process of satisfaction.

There are a number of objective criteria used to establish the quality judgments—things like product dimensions, chemistry, and mechanical properties. Measuring those characteristics and reducing the resultant data to comprehensible form is an important IT mission in the manufacturing process.

Rent said Lukens is "very much up-to-date in process control," using Digital Equipment Corp. data-collection systems, but is just beginning the task of integrating shop-floor data with management information systems.

Process monitoring and management accounting have long been connected, Rent said, but the focus of the systems was wrong—the data was often useless for total quality improvement. "Traditionally, people don't measure the right things. Industry will tend to be more focused on getting more tons, pieces or units per unit of time than on improving from 98 percent to 100 percent success in everything they produce. It is more easily measured in dollars."

Electronic data interchange with customers also helps Lukens achieve more customer satisfaction-defined quality, speeding the production cycle and cutting costs "5 to 30 percent" in the process, Rent said.

While Lukens achieved its quality results in large part by changing the relationships among workers while leaving the structure of the production process intact, EG&G Inc., a

Now instead of quality-assurance efforts to make a product meet engineering specifications, avant-garde manufacturing engineers speak of "total quality," defined as customer satisfaction with the end result.

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high-technology engineering and manufacturing conglomerate based in Wellesley, Mass., achieved substantial improvements at its instruments manufacturing plant by changing both the production process and the relationships among workers.

Managers of the Oak Ridge, Tenn., unit dismantled its pump manufacturing assembly lines and reassigned its workers to teams, each of which would handle the production of an individual pump from start to finish. The result, according to David Crowell, corporate director of quality for EG&G, was "reduced cycle time," as raw materials were converted to finished goods in days rather than weeks, and "much higher levels of quality," as pumps performed uniformly under harsher conditions.

Making the EG&G team structure work requires intensive use of information tools in new ways, both by the assembly teams and by their managers. Process measurement and control have become even more vital—"You can't tell if products are getting better unless you can get accurate numbers, and get them when you need them," Crowell said—while giving the teams more job control has created the need for more analytical tools on the shop floor. "What we find is that most people have a natural curiosity. They like to do problem-solving if they are given the tools to do it."

Information technology can be an enabler in the quality drive even when basic manufacturing processes and worker relationships remain traditional.

Training for production workers not used to controlling their own jobs was the most important element in making the IT investment pay off. They needed specialized instruction in the nuts and bolts of problem-solving: how to analyze the data and keep track of elementary statistics. "It takes time," Crowell conceded.

Information technology can be an enabler in the quality drive even when basic manufacturing processes and worker relationships remain traditional, as shown by the experience of Bridgestone/Firestone Inc. (the new name for the now-Japanese-owned Firestone Tire & Rubber Co. of Akron, Ohio). Bridgestone/Firestone uses its information system to bridge the traditional gulf between manufacturing and customer service by feeding data on warranty claims back to design and process engineers. "We look at all customer returns," said Bob Johnson, director of quality assurance for the giant tire maker. "We look by region of the country, by particular problem, or particular date of production, . . . then develop countermeasures that will eliminate those production problems."

Like other mass producers and marketers, Bridgestone/Firestone uses IT to control its manufacturing processes—in Johnson's words, "making sure that variation at the manufacturing plant is minimized." But the information system also provides an analytical function for management, enabling executives to set the most effective possible priorities, Johnson said. "The information system helps us focus our resources [on critical factors], and that's the way we get the biggest bang for the buck."

One result: Twenty years ago, the average premium passenger-car tire would do well to survive 15,000 miles. Now, after two decades of incremental improvements (more durable rubber compounds and reinforcing fabrics, radial tire construction, more uniform tread-molding techniques and improved quality efforts), top-of-the-line tires can be guaranteed to last as long as 60,000 miles.

Realizing such a dramatic gain required a long-term commitment at Bridgestone/Firestone; likewise Westinghouse's achievement of a 99.995 percent rate of perfection in nuclear fuel rod production. But now that the nuclear fuels division has reached that plateau, Jack Fooks is looking ahead, hoping to eliminate those last five errors per 100,000 rods produced.

"Quality is a journey of continuous improvement," he said. "You never really get there." CIO

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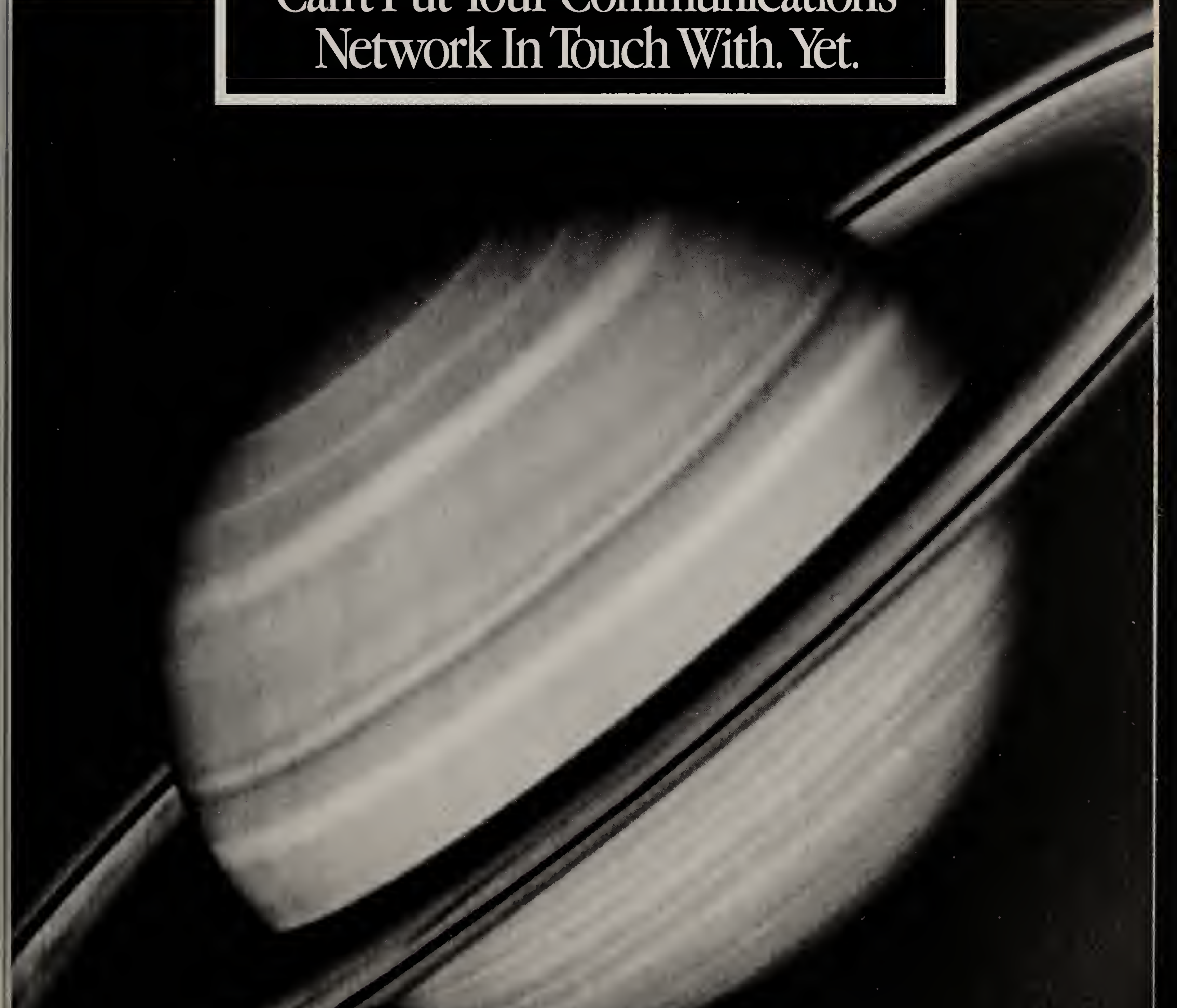

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USWEST

PHOTOS BY BILL FARRELL

ORDER OUT OF CHAOS

US WEST's post-divestiture information systems were a labyrinthine web of applications, hardware and redundant data. Now the RBOC is rebuilding its systems on a distributed platform

BY B.G. YOVOVICH

It would be hard to find a re-systemization challenge more daunting than the one confronting the IS division at US WEST Communications, the regional Bell operating company in Englewood, Colo.

For starters, the company finds itself ensnarled in a labyrinth of disparate and disconnected information systems that are the legacy of the Bell System breakup in the mid-1980s. Each of the seven RBOCs "came out of divestiture with an inheritance of big, complex and, to some degree, technologically obsolete systems," said Henry Swan III, a telecommunications industry specialist with the Arthur D. Little Inc. consulting firm in San Francisco. Much of the motivation for introducing newer computer systems was mitigated by the monopoly status that virtually all the Bell telephone operations enjoyed. At the same time, local telephone operations were generally regulated by state commissions, resulting in a Bell System that was composed of a large number of geographically organized, relatively independent state sub-units—each with its own IS operation.

"The information systems were built on a large number of different technologies—in

WINSTON J. WADE *(left) at the site of the future US West research center in Boulder, Colo.; above, the resystemization team of (left to right)* **SCOTT BERMAN, DAVE REBERRY** *and* **BRUCE ROBINSON.**

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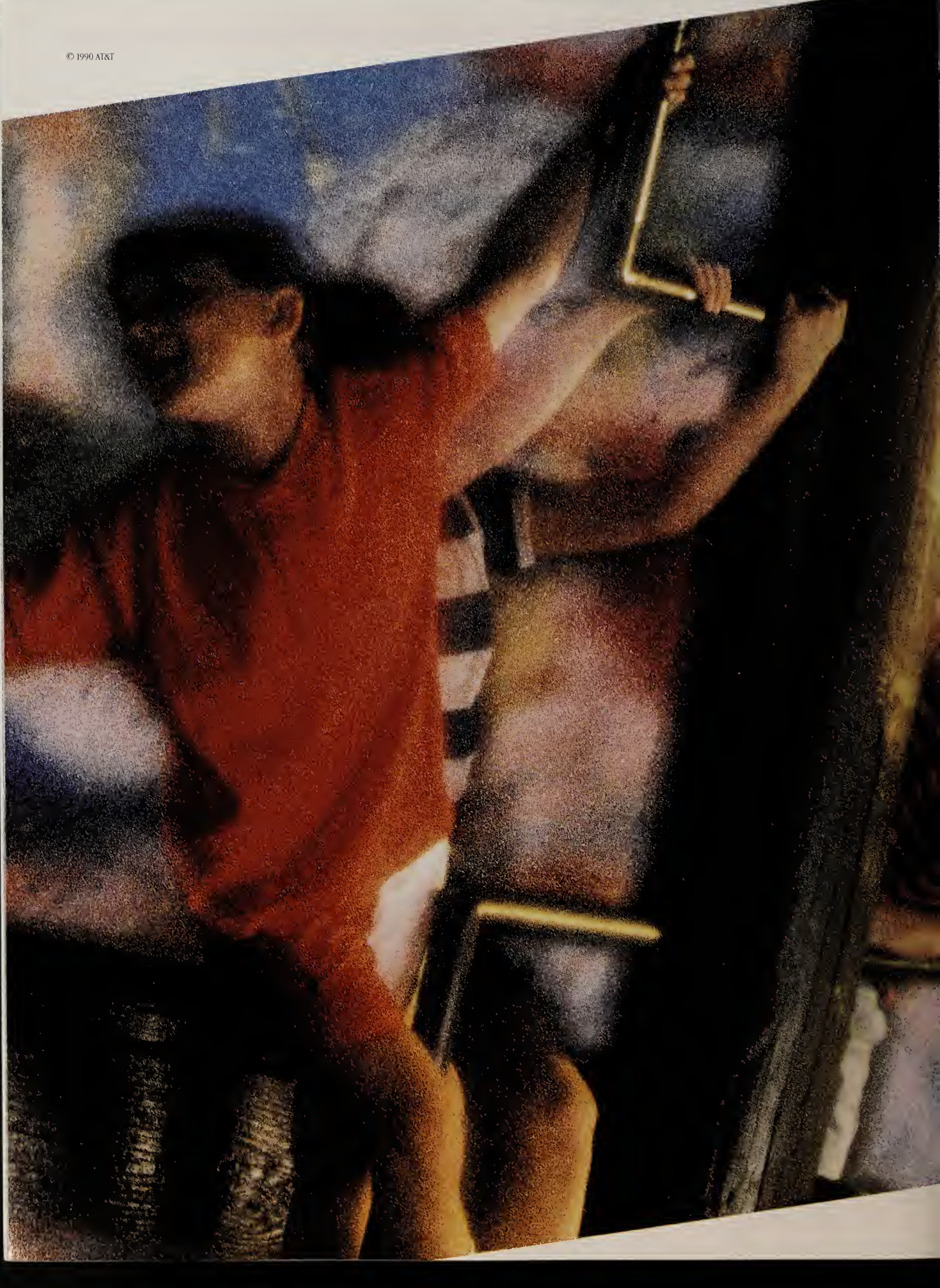

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REBERRY: *trying to link "a little bit of everything."*

some cases even using non-standard operating systems written specifically for them," said Swan. "Because they were built with first-, second- and third-generation computer technology, there wasn't a great deal of sharing of data, and an incredibly complex webbing of systems arose" to interconnect the various systems following divestiture.

In the case of US WEST—which is an amalgam of the Mountain Bell, Pacific Northwest Bell and Northwestern Bell operating companies—the post-divestiture IS operations found themselves running more than 1,000 different applications.

"We came from three telephone companies, and there were no data highways between those companies, so we have three of most systems," explained US WEST Vice President Winston J. Wade, who heads up the company's IS operations. In terms of hardware, "we had a little bit of everything, and there was no architectural plan" to link together all the disparate parts, said Dave Reberry, vice president of systems engineering and development, who is overseeing the US WEST resystemization effort.

Data organization was chaotic as well. "We have customer data stored in at least 120—and maybe as many as 200—different places and have no comprehensive list of our customers," said Bruce Robinson, technical director in charge of architecture and modeling for a new billing system under development at US WEST. Moreover, much of the application portfolio consisted of astonishingly aged software based on long-outdated technology, including "one of our billing systems [that] is 27 years old and is in assembly language," said Reberry.

As if things weren't difficult enough, the company's IS organization not only has to meet the challenge of serving a diverse set of customers, but it also has to provide that service over the most dispersed of the RBOC geographical areas. US WEST's service sector covers 14 states and 40 percent of the continental U.S. land mass, extending from the deserts of Arizona to the lush forests of Washington State and from the Rockies across the Great Plains to Minnesota.

Most serious of all, the shortcomings of US WEST's IS operations

> *"It is one of the most technologically complex environments on the face of the earth, and as they try to do new things, every time they add another piece to their information systems, they compound the problem."*
>
> *–Rudy Puryear*

Service Support

US WEST's new support system provides service reps with transparent access to multiple data sources

US WEST's new C-LINK support system for service representatives illustrates the kinds of direct benefits the company expects to accrue from its distributed approach to resystemization.

The existing system uses 3270-type terminals to patch service representatives for the Englewood, Colo.-based RBOC into the various applications that contain information needed to answer customer queries. These range from questions about long-distance charges on their most recent bills to requests to be signed up for additional services. Depending on the particular type of query, the current system requires service reps to log in and out of various mainframe-resident applications in order to get the information they need.

"Each application has a different [screen] format," explained Scott Berman, a member of the team responsible for C-LINK, "and the service rep needs to know all the difhave been proving woefully inadequate for the new business environment in which the company now finds itself. Technological developments have made possible a variety of new services such as cellular communications and voice mail, and deregulation has opened up the telephone industry to intense competition. Moreover, in addition to branching into new areas of business (including real estate and financial services), US WEST has radically reorganized its telephone operations to try to make itself more responsive to the new competition in its core business.

The state-oriented organization inherited from the Bell System era has been dismantled and replaced by a structure that is more consistent with its embrace of a more marketing-driven strategy. In place of units that serve geographically defined sectors, US WEST is now made up of units serving a variety of market segments, including those that specifically focus on services for home and personal accounts, public consumer operations (pay phones), large businesses, small businesses, federal agencies, and government and education clients.

> *"Our resystemization program is an internal effort to fundamentally move ahead and replace the application portfolio and to do it in such a way that we will change how we manage and operate the business."*
>
> *–Dave Reberry*

Unfortunately, it has become painfully apparent that the state of US WEST's IS operations is proving a formidable impediment to the successful deployment of the company's new marketing-oriented strategies. "There are so many things that the market units would like to do, but we can't because the infrastructure is not there to do it," said Wade. "It is very difficult to make changes. A change in business requires a change not in one system, but in many of the interconnected systems." This lack of flexibility "makes it impossible for us to respond to business needs. If we want to introduce a new product or service, we can't get all of our systems updated quickly."

Furthermore, added Robinson, "even if we can introduce them, we can't bill for them, so there is a real problem."

Even seemingly simple changes cannot be accommodated. For in-

BERMAN: *seeking front-end transparency that remains consistent despite a changeable infrastructure.*

ferent sets of commands in order to get in and out of the various applications and retrieve information."

With C-LINK, service reps get a number of new capabilities, including online reference manuals and a set of "Sales Advisor" features that should help them become more effective at selling additional phone services. Representatives also benefit from the simplified interface made possible by the system's Communications Manager, a front-end module residing on the service rep's terminal that handles the retrieval of needed information and provides the representative with a single, integrated interface regardless of which data source the system is tapping.

The distributed nature of C-LINK's design also makes it a lot easier to make changes in the system—a flexibility that paid off when adjustments were made following a trial deployment last summer. "We had learned a lot from the trial," recalled Berman. "For example, we had not realized how often certain of the data items were accessed. In some cases, the service reps had to go through two or three different windows in order to get at that data, so we made some modifications to make that information more easily available. It will save a couple of keystrokes and 10 to 15 seconds, thousands of times over."

Because of the distributed design, the changes could be made in the Communications Manager module residing on each workstation instead of requiring the more complicated process of making changes in a mainframe-resident application. Some of the data-presentation changes can be made in only 10 or 15 minutes; for instance, moving a particular data field on a screen. "In fact," Berman said, "the power to customize the user interface for the particular individual exists in the architecture, though we don't give that power right now to the service rep."

US WEST began deploying C-LINK in early 1990 and expects that all of the company's 4,000 service reps will be on the system by the end of next year.

—B.G. Yovovich

TECHNICAL PROFILE

US WEST Inc. is a diversified corporation with assets of $24 billion, annual revenues of more than $9 billion and annual net income of more than $1 billion. US WEST Communications provides communications services and data solutions to more than 10 million residential and business customers in 14 Western states. Other subsidiaries offer directory publishing and other marketing services, cellular mobile communications and paging, cable television, and financial services.

Large and Mid-Range Systems: US WEST operates seven data centers that use IBM and Unisys mainframe environments. Mainframe models include IBM 3090 and 3080, Amdahl 5890 and 5880, and Unisys 1100 and 2200. The company also operates some 1,500 minicomputers by AT&T, DEC, Honeywell, IBM, Prime, Pyramid, Sun, Unisys and Wang.

End-User Computing: over 105,000 workstations in offices throughout a 14-state region and worldwide. These include Sun 4s, IBM and IBM-compatible PCs, Macintosh PCs and IBM 3200 terminals.

Software: US WEST operates over 1,000 mainframe application programs, most internally developed or purchased from Bell Communications Research (Bellcore). Its mainframe operating system software is currently converting to ESA from an MVS-XA environment. Unix mainframe applications run on Amdahl UTS. Primary database software includes IMS and DB2. VM/PROFS and Wang Office are used for electronic mail.

Networking: Two major synchronous networks provide access to the company's mainframe environments. A third provides connections for Unix-based minicomputers. The three networks share common backbone facilities to provide economies of scale. As the company moves to a distributed architecture, these networks will evolve to take advantage of the higher transmission speeds that will become available under switched multi-megabit data services and broadband integrated services digital network.

stance, said Wade, "we might want to do promotional pricing, but our systems just fundamentally don't support promotional pricing in any context."

Altogether, summarized Rudy Puryear, managing principal and head of the telecommunications practice at the Nolan Norton & Co. division of the KPMG Peat Marwick consulting firm in Chicago, "the costs of maintaining the existing portfolio of spaghetti code that has been patched together and interlaced is an expensive drain—not to mention the opportunities in which [the company] will not be able to compete as deregulation moves along. It is one of the most technologically complex environments on the face of the earth, and as they try to do new things, every time they add another piece to their information systems, they compound the problem."

Clearly, all of this adds up to a strong argument for completely overhauling US WEST's information systems. Rather than tackle the problem head-on, however, US WEST has adopted a tack that, if it succeeds, could be a model for the many other organizations encountering analogous difficulties.

"We decided to see if there was a way that we could respond to the short-term needs of our clients, but do it by taking an integrated approach that would drive us toward something different—toward a new application portfolio," said Reberry. "Our resystemization program is an internal effort to fundamentally move ahead and replace the application portfolio and to do it in such a way that we will change how we manage and operate the business."

One of the first steps was to embark on an in-depth study of US WEST corporate strategies and the IS implications of those strategies.

ROBINSON: *Without sharable data, "we will have failed."*

"We wanted to understand the needs today and where they might evolve," said Wade.

The basic idea was simple: US WEST's IS group would work with the company's individual units to create not only a strategic systems plan based on each unit's business imperatives—where it is going and what investment opportunities it foresees—but also a system transition plan for how to get there. These various subplans would then be taken by the IS group and combined into an integrated corporate resystemization plan.

> *"We are trying to use an information-integrated approach that separates the data from the application, from the technology. Data needs to be a corporate commodity."*
>
> *–Bruce Robinson*

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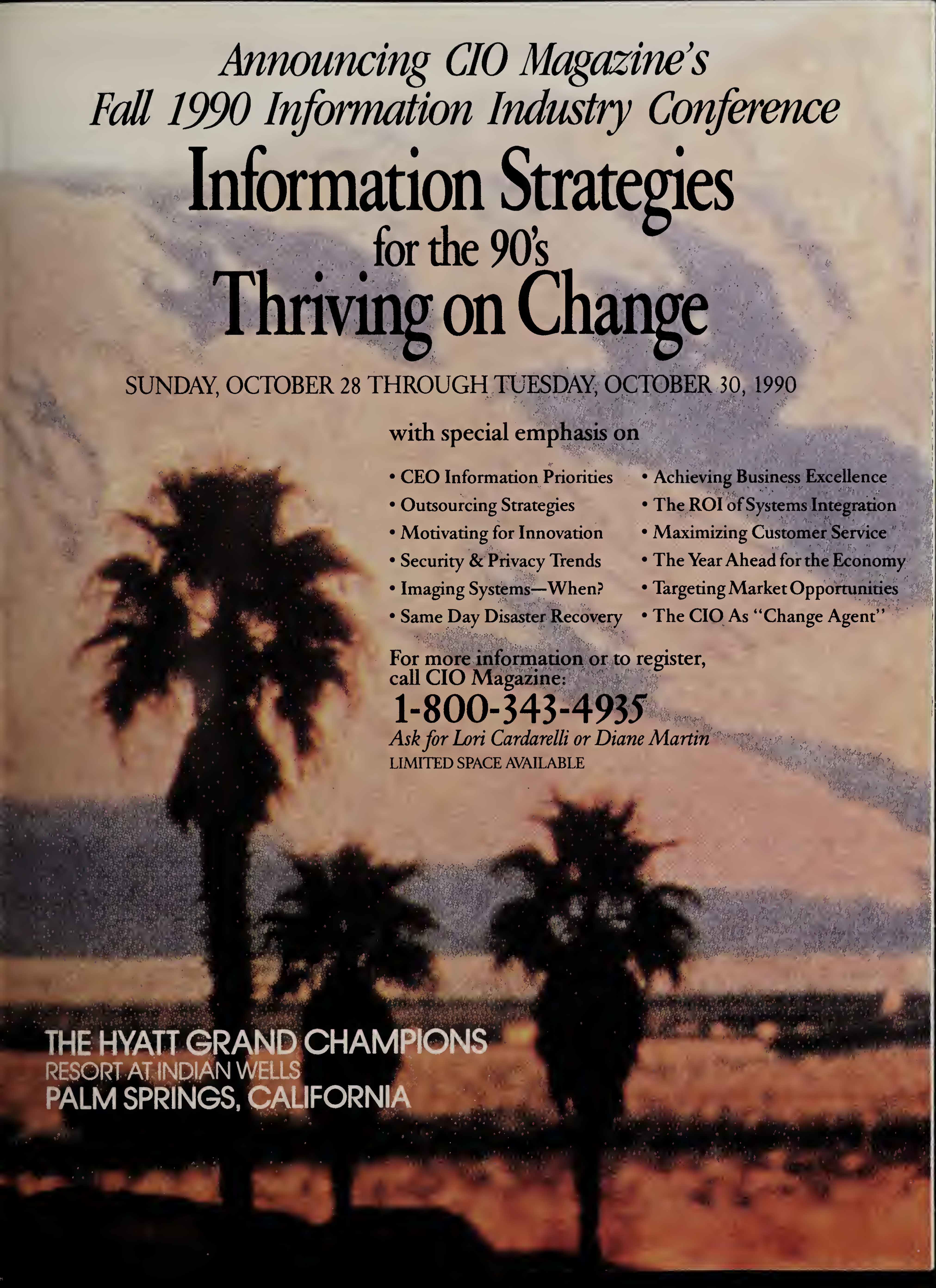

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Such a major overhaul will not come quickly: The planning began in 1987, and the entire resystemization is expected to be phased in over the next 10 years.

Were only technical considerations involved, Reberry said, "it could be done quicker than that. But there are lots of issues to resolve that don't have to do with the technology or the applications that we are building, but with the business units determining the new ways that they want to manage and operate" their business.

> *"What we didn't build 15 to 20 years ago was flexibility. In the new system, we want change to be seen as the normal thing."*
>
> *–Winston J. Wade*

Moreover, he added, "the units are not totally independent. There are inter-relationships, and there are issues that need to be resolved, and we have to make sure that they match up."

An important realization emerged early in this process. "We have come to the conclusion, as many other companies have, that data is key to everything," Reberry said. "You want to give the units the data and the wherewithal so that they can be very reactive to the marketplace."

It also became clear that if US WEST was to avoid perpetuating its existing systems' problems, this data would need to be "managed under a common architecture that provided inter-operability [and] inter-connectability," Reberry said. "Every one of our many systems has its own database, each built individually. The databases may have some of the same data items, but the descriptions of the data items are not the same, and even if the descriptions are the same, the contents might not be the same, so we end up with inconsistencies in the content and with redundant, overlapping data."

Such problems convinced US WEST to make sure that the resystemization effort included an integrated plan that would "not only build a new applications portfolio, but be based on the concept of one and only one source of data," Reberry said. "I am not saying that there will be only one database in the sky, but logically, there is one place that we go to get a particular piece of data."

"We are trying to use an information-integrated approach that separates the data from the application, from the technology," added Robinson. "Data needs to be a corporate commodity, and if at the end of this project we end up with data that is not sharable and not usable by the other related systems within US WEST, then we will have failed, because that is the main problem with our systems right now."

The pre-planning process has also made it clear that the resystemization effort should aim "to build flexibility into the system so you can change it," said Wade. "What we didn't build 15 to 20 years ago was flexibility. In the new system, we want change to be seen as the normal thing."

As these and other requirements have taken clearer shape, the US WEST resystemization team has come to the conclusion that it is better to adopt a new computing architecture based on distributed computing than on traditional host-based computing.

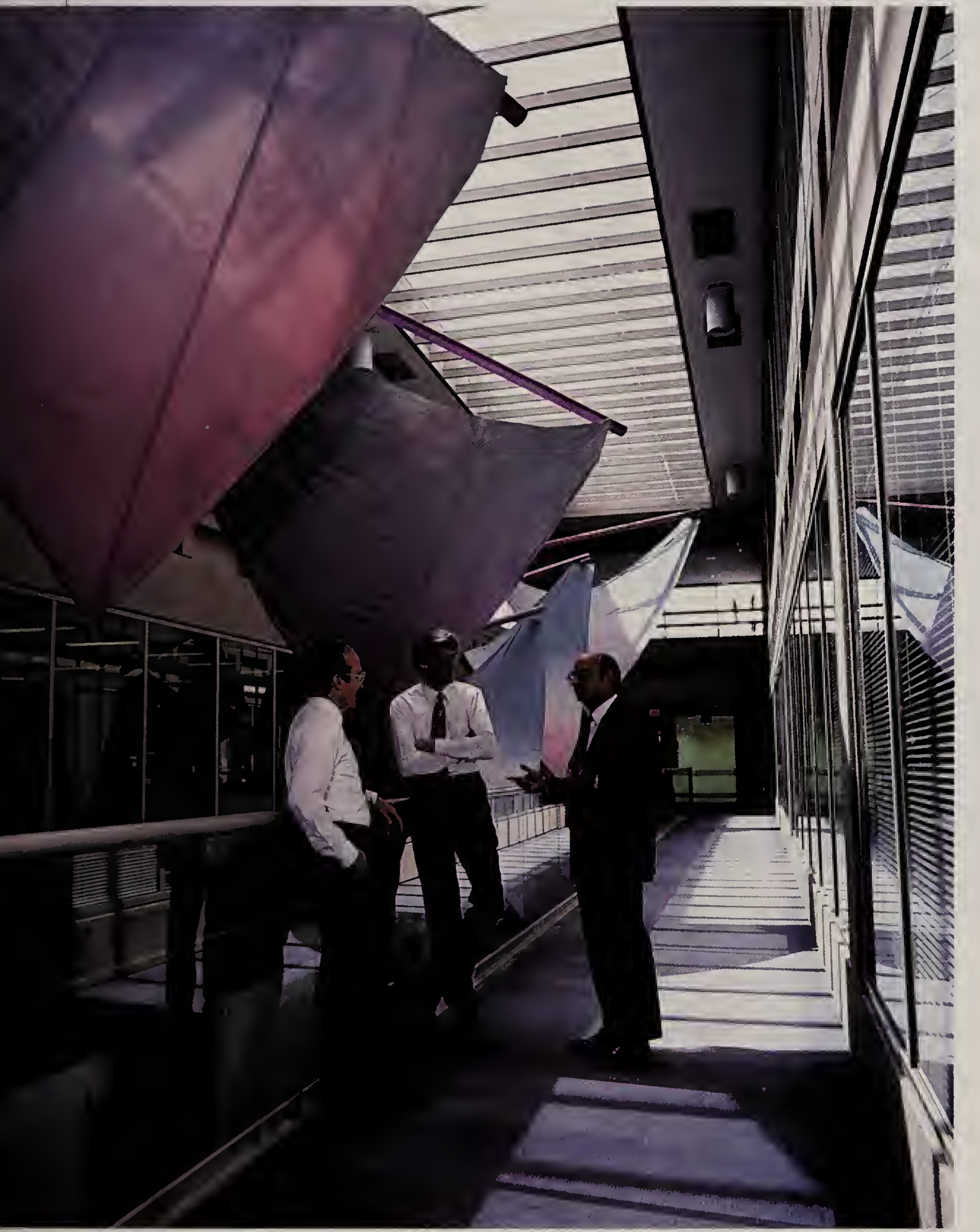
"Distributed is attractive in that you have central data repositories, but you can have a distributed base of applications that you can change easily," explained Wade. "You don't have the kind of a big, humongous mainframe application that, every time you want to make a change, you have to damn near go into the guts of the code." The distributed approach also has the attraction that "you can go back into central databases, pull the data you need, and format it in a way that is tailored for a particular customer," he added. It is even possible to put some of the capabilities for making changes in the applications "in the hands of our clients, as opposed to doing it on a centralized MIS basis."

Using a distributed technology platform also makes it much easier to take an incremental approach to implementing the resystemization effort. "It provides a very elegant transition plan for how we get from today's environment to the future environment," said Reberry. For example, even before the anticipated central data repositories are in place, "we can build new applications on this distributed technology platform and have them go and get the data where it is today." Later on, when the databases have been created, the distributed platform makes it a relatively simple matter to install database processors, data servers and future online transaction platforms that will tie the distributed applications to the new databases and make it possible to retire the old systems.

ROBINSON, BERM

The UNIX-based distributed platform will be capable of operating in a number of different configurations, including simple workstations, workstations connected to servers, and X-terminals sitting in front of servers. It will be composed of three different layers—an operating system, standard services, and applications—the first two of which will be based on national and international standards and will be obtained by US WEST from outside suppliers.

Implementing the platform incrementally "means that you don't need to replace all of these humongous mainframe systems in one fell



REBERRY: *One lesson of chaos is that the distributed computing model can help accommodate change.*

swoop," said Wade. "You can do the front-end work and gauge your implementation by the customer need. You deploy the applications as you need them, as the market dictates, as you can financially do it."

In addition to the distributed technology platform that will run things in the front office, there are three other major components: an OSI-based data communications network; a data platform that will provide online, high-response access to operational data; and an online transaction platform. These other elements are still in the planning stages, Reberry said. "We do have a request-for-information right now for a data platform and an online transaction platform, but it will probably be 1991 before we formalize it and actually start picking the hardware suppliers."

The value of this incremental capability is evident in US WEST's new C-LINK application, which handles the information needs of US WEST customer-service representatives (see related story). A key element of C-LINK is "a module that we call the Communications Manager," said Scott Berman, a member of the team responsible for C-LINK. "Whenever a customer-service rep asks for a piece of data that he or she needs, the Communications Manager goes out and gets it in a way that is transparent to the service rep.

"As we move forward in the resystemization and those back-end systems change, all we need to do is tell the Communications Manager that instead of going to the old source of the data, it should go to the new source—all without changing the way that the information is presented to the service rep."

Despite the advantages of a distributed platform, however, some resystemization problems persist. Even in a distributed environment, there are still some parts of the effort that are not amenable to an incremental approach. For example, the new billing system that is currently in the design prototype phase contains a lot of data that is accessed by other systems. According to Robinson, "There is no nice way to replace that information [incrementally]."

The distributed platform approach can also exacerbate problems. It can give rise to some sticky internal negotiations regarding who pays for the development of the new systems because, explained Reberry, "we get to use a lot of the same pieces for different applications. You get into a political dimension" regarding the share that the different units should pay.

US WEST is still convinced, however, that the distributed platform is the approach that makes the most sense for its resystemization effort.

"We haven't got all the answers or all the pathways mapped out," said Wade, "but we are working on it aggressively, and we think that we know the direction." If all goes according to plan, he added, this effort will lead US WEST to being "better able to meet the needs of our customers and our markets."

B.G. Yovovich is a freelance writer based in Evanston, Ill.

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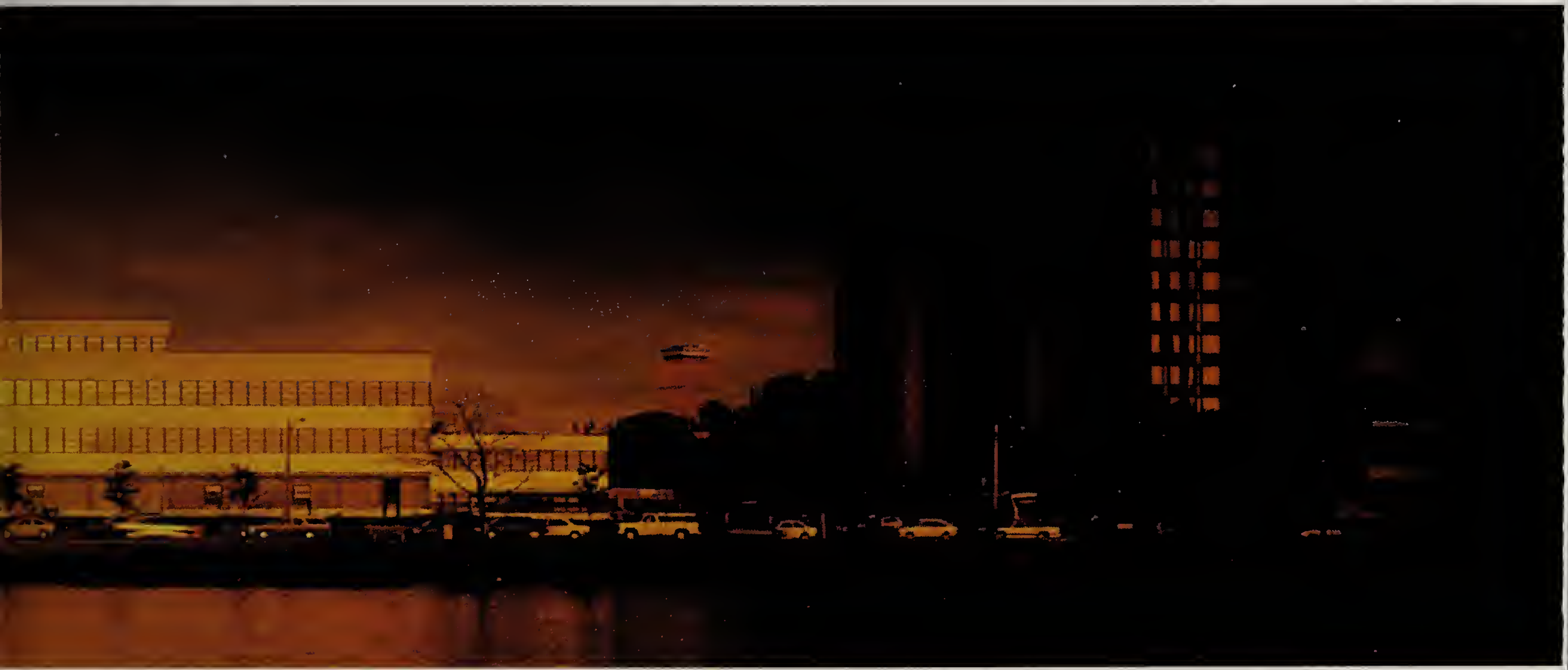

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THE GATHERING OF THE LANs

As maturing LANs get networked into a larger computing structure, companies are beginning to rethink their role in the corporate scheme of things

BY MEGHAN O'LEARY

From workgroups to wide areas to enterprises, corporate LANs have begun to cover more ground than the single departments they originally supported. And as LANs have grown in size, popularity and sophistication, they have become repositories of increasingly valuable information and more critical applications. The LAN is "starting to look more and more like a corporate resource" to many companies, said Ranjit Singh, director of Data General Corp.'s network services group in Westborough, Mass. "[It] is not a technology toy anymore; it's a utility."

This trend is due in part to the relatively lower cost and greater flexibility of a LAN compared to a mainframe or mini with dumb terminals. A growing number of companies now regard LANs as a more cost-effective and hospitable way to gain access to host-based information.

With these considerations in mind, corporations are beginning to look for ways to integrate LANs into larger corporate networks, forging links between LANs and other LANs or between LANs and larger systems.

Maintaining high performance at the user end while accessing information based elsewhere is the most compelling reason for many companies to effect the marriage between a LAN and a larger system. Commodities brokers, for example, may use high-power workstations to do analysis on real-time, external market information downloaded from the mainframe. "One of the key missions in a trading-floor information system is very, very rapid, timely and reliable delivery of market information to the end user,"

DENNIS D. RUSSELL: *A LAN helps keep Louis Vuitton employees involved and challenged.*

PHOTO BY JOSEPH BERGER

said Michael Schiffmann, senior vice president of marketing for Rich Inc. in Oak Brook, Ill., a provider of turnkey financial systems and a subsidiary of Reuters. "There is also the requirement to provide substantial [added] value to the end user."

On the trading floor at the Canadian Imperial Bank of Commerce (CIBC) in Toronto, 280 traders have access to market information, returns and rates via a LAN connected to the institution's IBM mainframe. The traders have tools that allow them to manipulate that data to support their decision-making processes, said Tony Paxton, CIBC's vice president for global trading facilities. According to Paxton, the LAN offers greater responsiveness than the brokerage firm could have achieved with dumb terminals. This is largely because mainframe terminals have no intelligence—or processing power—of their own. And because the mainframe has to serve as the central processor for all its terminals, its speed declines as each new user is added. With a LAN, however, information is processed by each individual machine, and rather than further taxing a central processor, new users in effect bring their processing power with them.

Such powerful individual tools linked to a larger information re-

GREG KELLEY: *"All of the challenges have been political."*

source can also serve to empower and motivate employees, said Dennis D. Russell, vice president of finance and administration for Louis Vuitton North American Companies in New York. Louis Vuitton has PC terminals at each of its stores that feed information to a 40-node Novell LAN in New York, which, in turn, is linked to an IBM mainframe. According to Russell, the network helps to keep employees involved in the company's operations.

"It acts more in the area of motivating the manager, which is a key concern of ours in retail," he said. "If the employees feel that they are being dictated to and have no input as to the type of information they're responsible for, . . . they're not going to be fulfilled by their jobs . . . and I'm going to have more turnover."

Louis Vuitton chose a PC LAN approach for its retail stores instead of the more common dumb retail terminals because "we wanted too many things that were peculiar to us and [did not apply] to general retail," Russell explained. For example, Louis Vuitton changes its prices only once a year. The company has no sales and no markdowns. It is more concerned with collecting demographic data about its customers—something traditional retail terminals don't do. "We knew we would have to do a lot of tailoring," Russell said. "That led us to a PC environment." An integrated LAN allows Louis Vuitton to customize its applications while still taking advantage of the capabilities of the mainframe.

A LAN also offers a level of expediency in applications development that is often missing from the mainframe world. Greg Kelley, campus LAN administrator at the University of New Hampshire (UNH) in Durham, developed a Novell LAN-based front-end cashiering system for the university's mainframe accounting applications because the mainframe support group had no time to develop the application. Likewise, Kelley's group wrote a customer applications program running on another Novell LAN for managers handling the university's mainframe-based student information-system payment activities. According to Kelley, the mainframe portion of the system provided only about 60 percent of the daily operational tasks that the office managers needed. The LAN system allows managers to process bills, take payment and produce receipts for students without bogging down the mainframe. At the end of the day, the LAN transactions are batched up to the mainframe.

The ease of developing LAN applications also makes them attractive from a personnel standpoint, according to Louis Vuitton's Russell. "It's much easier to get a PC programmer writing in C than it is to get a System/38 programmer," he said.

> *In the client/server model, a database server (or a mainframe) uses its own intelligence to extract only the data requested by a client query, rather than having to send large packets of data for the PC to sort.*

Integrating LANs into the larger network is giving rise to a new model of computing known as a client/server architecture. Most LANs currently are built on a local-intelligence model, wherein the intelligent part of an application runs on the workstation, and the data is stored on a central, high-power PC, or server. A request for data sent to the server requires that large packets of data and entire files be sent to the PC, where they are sorted. This model increases traffic on the network and slows down performance.

The client/server model, on the other hand, is a form of distributed processing in which a single distributed application is split into a front end that resides on the workstation and a back end that runs on a server or larger system anywhere in the corporate network. The client portion of the application presents and manipu-

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HERBERT J. MARTIN: *Interoperability can't be achieved without considerable applications redesign.*

PHOTO BY CINDY CHARLES

lates data at the PC level, while the server portion of the application stores, retrieves and guards data. In this architecture, a database server (or a mainframe) uses its own intelligence to extract only the data requested by a client query, rather than having to send large packets of data for the PC to sort. The client/server model also takes advantage of the centralized control capabilities of mainframes and minis while making the most of PC processing power.

Since many companies have more PC-based MIPS than mainframe-based MIPS, it makes sense to take advantage of that processing power, according to Michael C.E. Smith, vice president of marketing and business development for Evernet Systems Inc., a network systems-integration company based in Los Angeles.

UNH's Kelley estimates that he has 20 times the power of the university's mainframes in his five LANs. The client/server model takes advantage of that dispersed power while providing for the efficient management of network traffic "so the system doesn't get bogged down trying to handle all the packets," Smith said.

Other issues that arise out of integrating LANs into the corporate system are not so clear-cut. Transparent access across systems, for example, which would allow users to get information from a corporate mainframe using the same commands and with the same interface they use on their desktop PCs, is becoming more critical. "Retraining is a fairly costly thing to do," said Singh. The simpler a company can make its systems, the more money it's going to save and the more useful its systems will be.

"You can't be truly effective working with a number of systems if you have to learn to do [things differently] with each one of them," said Smith. Still, the applications software that would allow transparent access to any network resource lags behind the wish lists of companies striving for interoperabilty. Those who do achieve transparency will pay a premium for system design.

> *Transparent access across systems, which would allow users to get information from a corporate mainframe using the same commands and with the same interface they use on their desktop PCs, is becoming more critical.*

"What people are looking for is basic interoperability," said Herbert J. Martin, president of The Wollongong Group Inc., a network systems integrator based in Palo Alto, Calif. "[However], there's a tremendous amount of applications redevelopment that needs to be done to get [to that point]."

Part of that interoperability is seamless integration on the front end, said Bert R. Ott, vice president of sales for Gateway Communications Inc., a LAN product manufacturer in Irvine, Calif. Companies would like to make cross-corporate networking "idiot-proof," so that users needn't even be aware "that they have switched from their local drive or LAN disk over to the mainframe disk."

One avenue to interoperability is

standardization of products at the corporate level, according to Bruce Quigley, president of DNA Networks Inc., a LAN manufacturer in Malvern, Pa. "In the past, most of the departments . . . within a corporation have, more or less, purchased [LAN] products on their own," he said. According to Quigley, tying the solutions together is an afterthought in many companies. Physical LAN integration and the ensuing centralization of LAN administration will give companies more control of what products are being bought.

MARK THEOHAROUS: *Is there a conflict between network control and network usefulness?*

PHOTO BY NEIL MACDONALD

Enforcing corporatewide standards can also help to address some of the security issues that arise when so many users with so much power can access any information source on a network, according to Mark L. Theoharous, manager of the Telecommunications Consulting Group for Andersen Consulting in Chicago. "You have a dichotomy," he said. "You want to increase the value of information to the departments, but at the same time you need to gain control over the network."

Standards, Theoharous believes, "keep the renegade user from running wild. No matter what, [users] are going to want some information that resides elsewhere. They're going to need to interact with other groups, and if they aren't compatible with some central authority [with regard to] standards, then they're not going to be able to get the information." But even with the proper security mechanisms in place, Theoharous cautioned, corporations can carry openness too far. "Do you really want everybody in a 10,000-person corporation to be able to send messages to the chairman?" he asked.

Regardless of the levels of security and openness a corporation decides are necessary, making the LAN part of larger corporate systems signifies the evolution of decentralized computing, according to Scott Stein, an analyst at International Data Corp. in Framingham, Mass. What began as a physically decentralized form of computing is now only logically decentralized: That is, the function of the workgroup is decentralized while administration and management are handled centrally.

The opportunities for sharing information under this type of arrangement are vast. But the challenge of gaining control over a corporate information resource that in many companies has blossomed outside the shadow of the central IS umbrella is forcing organizations to alter their information management models.

"MIS managers have been seeing a lot less control because of disparate LANs all over the place," said Taia Ergueta, product marketing manager for Multivendor Support at Hewlett-Packard Co. in Mountain View, Calif. "[Integration] is creating some major support-related issues for them. . . .

"The people who have felt all this desktop power have really reveled in it," Ergueta continued. ". . . What's happening is [that] as they go along and expand these networks and start linking them up to each other and create new corporate backbones, they're creating the needs for structures and procedures that are like the ones they left behind—or thought they left behind."

And along with the management issues come turf issues. "Today there is a problem with data ownership," Theoharous pointed out, "especially when a particular department just ends up building this monster LAN because it's the only place they can house the data."

"The technical problems of hooking into the mainframe are really

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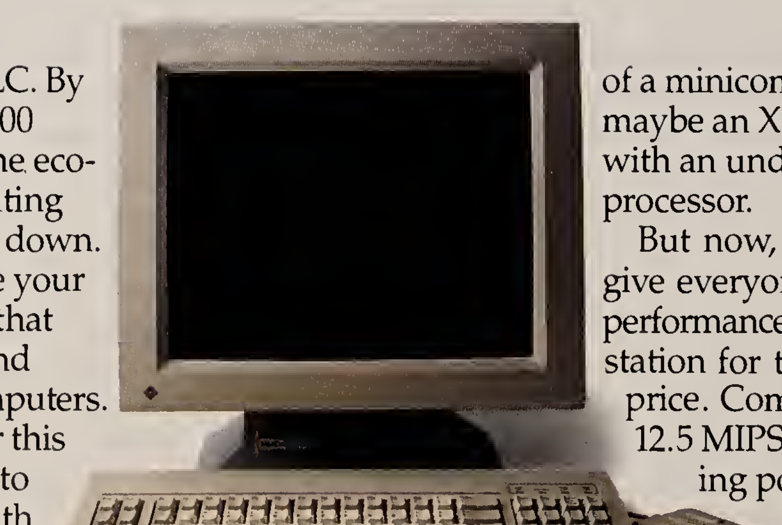

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minimal," said UNH's Kelley. "All of the challenges have been political. There are several groups [at UNH] that consider themselves owners of particular network segments. What we had to do in providing backbone Ethernet services [to them] was to get them all to agree to disconnect the connections they already had [among] themselves." The backbone restored those connections and established new ones to other computing resources as well.

Many companies in the throes of network integration will find that they need to develop new models for managing resources and information, said Ergueta. "Each side comes at it with their own paradigm" for information management. The PC side believes in user independence with a minimum of centralized control, while the mainframe side takes the opposite tack, she said. "No one understands, or can take responsibility for, the implications of a large system. You have to start separating, by network-management function, which activities should be centralized and which need to be at the department level."

Ergueta stressed that a broad view of the system is a requirement for any manager. She cautioned against the temptation to rely on a departmental LAN manager to handle the job once the LAN is part of a larger system. "We have been in some meetings that end up getting kind of tense because it's very clear that the company is in the process of making the transition to more centralized [network] control and decision-making."

Theoharous believes that the CIO's role is enhanced when LANs are integrated corporatewide. "The CIO [concept] really gains [popular support] in most corporations at this point," he said, because an integrated LAN breaks down the boundaries of the mainframe-dominated world of strategic information resources. "The CIO's position is often more influenced by data processing" than by decentralized, PC-based computing, he said. To acknowledge LANs as a part of the larger, corporate information resource may bring the CIO the support of the PC-using populace.

> *"Today there is a problem with data ownership, especially when a particular department just ends up building this monster LAN because it's the only place they can house the data."*
>
> *–Mark L. Theoharous*

Theoharous thinks that this kind of integration calls for the creation of a network manager position under the CIO. "The network manager is a recognition of the fact that the network stands on its own and is not [just] a task under the mainframe."

Managing the dispersed LANs in an integrated corporate information system presents a conflict for many companies, explained Data General's Singh. "As people are [integrating] LANs, they want to look at the cost per user." But as LANs become part of the corporate network, the cost of managing them (and thus the cost per user) goes up, he said. "A lot of [companies] are struggling with the decision [to provide those management resources]. They understand the value of it, but they also understand the budget they've got." Of course, the first time the LAN goes down and everything comes to a grinding halt, he concluded, users and executives alike will really begin to understand the value of managing the LAN as part of the corporate information resource. CIO

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OPENING ARGUMENTS

Law firms and corporate legal departments are just beginning to build a case for IT use

BY KATHLEEN MELYMUKA

Law firms traditionally have been five years behind the times in the general use of technology in the practice of law," according to Donald Coker, chair of the Massachusetts Bar Association Computer College Committee and a Portsmouth, N.H., consultant on technology-related programs for lawyers. Virtually everyone in the profession agrees with Coker, and while there are many reasons lawyers resist information technology (see related story, Page 58), those who embrace it have established precedents their more conservative brethren will someday follow.

Law firms and corporate legal departments are different in many respects, but they share a generally low commitment to technology. The law firm of Hunton & Williams and the legal division of First Interstate Bank of California are exceptions to that rule. Each has made a case for information systems that's difficult to refute.

Three years ago, Terry L. Crum, then the computing director at Virginia Commonwealth University in Richmond, was hired to bring technology to the law firm of Hunton & Williams, whose nine offices and 425 lawyers put it among the 20 largest law firms in the United States.

Since then, Crum, now director of computing and telecommunications, has installed an 800-PC wide-area net-

ILLUSTRATIONS BY JAY BELMORE

work. By the end of this year he plans to raise that number to 1,200; by 1991, 1,400. "We have lawyers, paralegals, secretaries and administrators on the network," he explained. "We're moving toward [having] one [networked PC] on every desk," said Crum.

Unlike some businesses that invest in technology simply because it's there, H&W had a definite goal. "Communications is the central nervous system of a law firm," said Technology Partner Don Irwin. "When you have multiple offices, you need to coordinate them. All the things that made a firm great to begin with get harder and harder to maintain as communications get attenuated by geography."

"The key issue," said Crum, "is to

Dissenting Opinions

You can lead a lawyer to a PC but you can't make him type. Those who know the profession say that lawyers, by nature and nurture, have an aversion to information technology.

While judiciously cautioning that "the legal profession is not a big monolithic group of people," Justice Neil Lynch of the Massachusetts Supreme Judicial Court allowed that, as a group, "they are contentious by nature. You get a room full of lawyers and it's difficult getting agreement that today is Monday."

"They are very mistrustful people because they know how the other side thinks," said Donald Coker, chairman of the Massachusetts Bar Association's Computer College Committee and a Portsmouth, N.H., consultant on technology-related programs for lawyers. "By nature they are combative, suspicious."

What's more, he continued, they're trained to stay that way. "Legal training has nothing to do with business. Lawyers want to think like lawyers, not like businessmen."

For example, lawyers don't think digitally. "An engineer is always looking for a two-plus-two-equals-four answer," Lynch observed. "A lawyer believes two plus two is never four. Sometimes it's three; sometimes it's five. Nothing is black-and-white."

"Lawyers don't go to business school," said Martin Erim, a lawyer who is president of American Legal Systems, an IT consulting firm based in New York. "They don't focus on administrative matters. They're slower [and] naturally conservative. That's why they're likely to be the last bastion of resistance to newfangled ideas."

Besides, added Coker, they're busy. "Most lawyers are working their rear ends off," he said. "Time is a commodity they simply don't have."

Finally, the legal work ethic, which stresses delegation at any cost and teaches that the touch of a keyboard is the kiss of death, is not conducive to the hands-on approach of the PC. Jay Ammerman, associate vice president for the information systems and technology group of the American Bar Association (ABA) in Chicago, explained: "I think attorneys tend to look at [PC applications] as back-office or administrative type functions to be delegated. [Their attitude is,] 'That's for my secretary to worry about.' "

Things are changing, though. Ammerman sees a different attitude in younger lawyers. "In the last decade, students have had greater exposure, and they're starting to create pressure. They expect the tools to be there and they're likely to use them."

But for every two steps forward, it seems, there's one step back. The ABA created its own network to try to persuade attorneys to use E-mail to send and revise documents, thereby reducing paperwork and courier costs. The effort was making some progress until the fax explosion.

"Fax has made such an impact this last year that the profession has suffered something of a relapse," Ammerman said. "Fax has increased the flow of paper. The documents still need to be marked up and changed and delegated back to support staff for retyping."

Despite the availability of the cheaper and more efficient ABANet, fax is the method of choice, Ammerman explained ruefully, because "it's easy [for an attorney] to find someone who knows how to use it." —*K. Melymuka*

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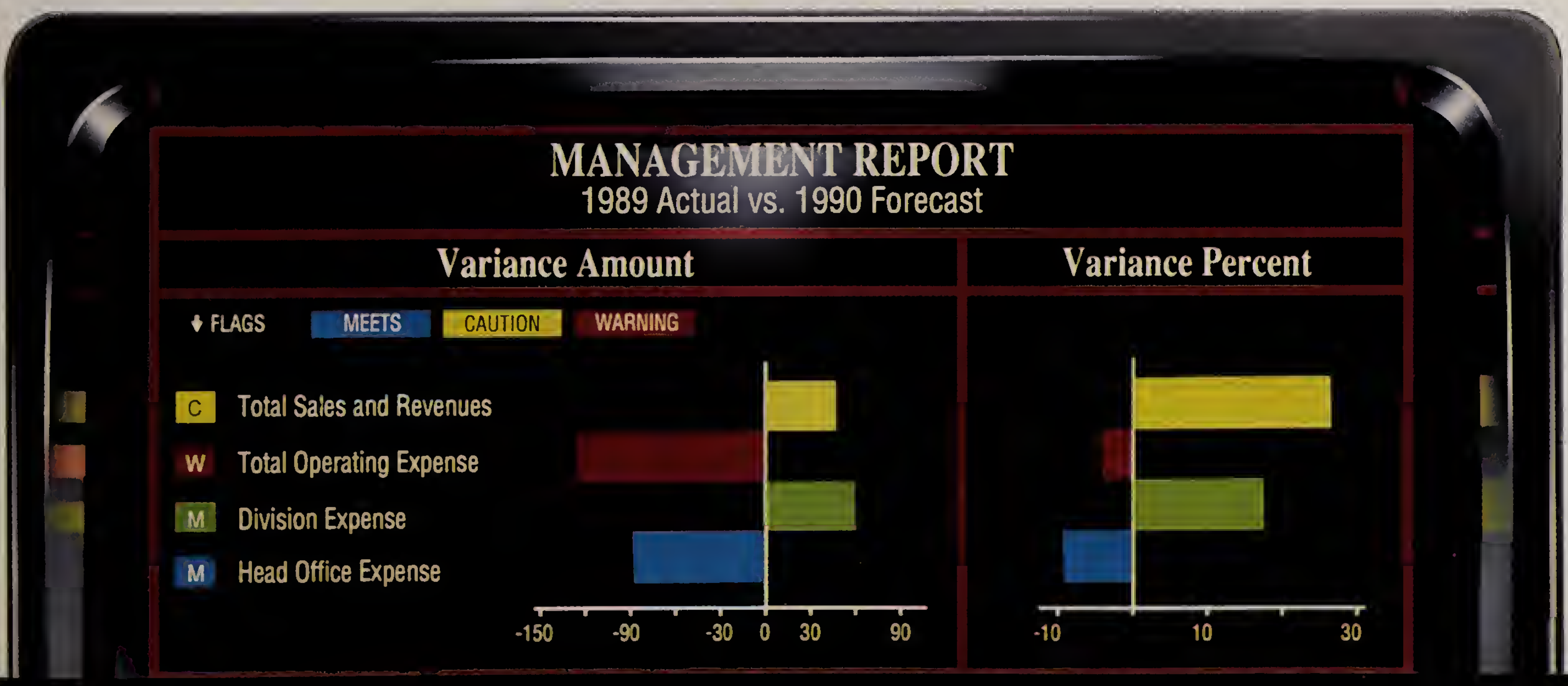


make it look like a small law firm with everybody in the same office. We want to have the ability to get things done that simply."

H&W's lawyers are divided into teams based on the kind of work they do: litigation, corporate and securities work, antitrust law, environmental/energy issues and so forth. The teams are distributed over all the offices, but they work together. "A guy in Richmond and a guy in New York need to work as if they were in offices next door to each other," Crum explained.

> *"When I came here almost 20 years ago, there were 67 attorneys and I was expected to know the name of each. Now there are more than 400, and it's hard enough to know the names of all the partners."*
>
> *–Don Irwin*

H&W devised a file-server strategy to accomplish this. "We store data in team data areas [of the file server], and anyone on the team has access," Crum said. Because cases may overlap team designations, each team also has access to the file servers of all the other teams.

H&W also has full-text retrieval. "There can be [hundreds of] depositions for one case," Crum explained. "[Now] we store depositions online."

Lawyers can manipulate the full-text database in many ways. They can search by key words, topics, names, dates and so forth. They can even mark places in text as relating to various points of evidence and then pull the text up later point by point. And any lawyer can access points marked by someone else.

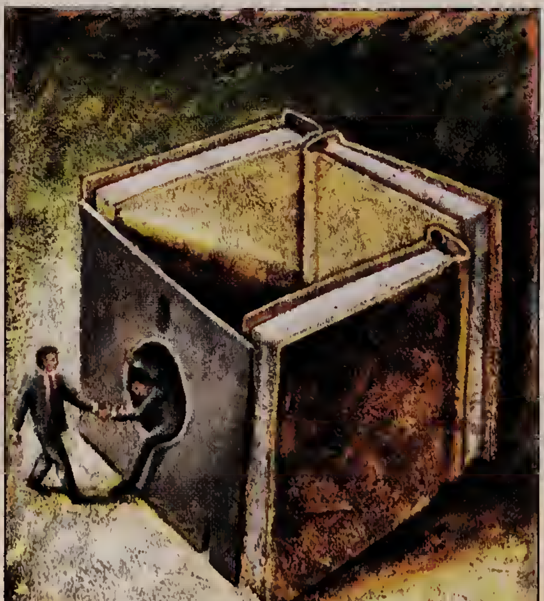
E-mail connects everybody together, and there's an E-mail interface to MCI to send messages to any place in the world. "It's great for editing and revision processes," said Crum.

H&W has also moved the system into the general counsels' offices of some of its larger clients for closer and more efficient communication. "We're setting up a link to a client in Hong Kong," Crum said. "He can work on things all day and send them on to us when he goes home. That's about the time we're coming in, so we can work on the stuff all day and send it back."

A bank of printers backs up the network. There's a desktop laser for every two secretaries, and a typical floor of 15,000 to 25,000 square feet also has one or two high-speed HP 2000s that print documents at 22

Some Encouraging Precedents

When the burden of proof is on the technology, a CIO should pay heed to the lessons of the past



Bringing technology to any functional unit requires as much human-relations savvy as technological know-how. That goes double for the legal department, where the CIO may be confronting a group of contentious knowledge workers who are negative by nature, pressed for time and disdainful of hands-on computing.

Folks who have been there offer the following advice for IS executives:

- Don't try to fake knowledge of the legal profession's basic electronic tools. "People take [LEXIS and Westlaw] for granted," said Martin Erim, president of American Legal Systems, an IT consulting firm based in New York. "You can't come in and try to show expertise without knowing them. People will say they want an application to look 'LEXIS-like,' and you'd better know what that means."
- Speak the language. "A good technical person needs to speak computerese *and* legalese," said Erim. "Lawyers are not trained in [technology]. They come with raw problems and need consultative involvement. If they don't get it [from the CIO], they will go outside the corporation."
- Take it slow. "Introduce technology in stages, and find pioneers—people willing to experiment," advised Jay Ammerman, associate vice president for the in-

pages per minute.

To print to another office, a lawyer calls up that office floor plan on his PC, picks the printer closest to the target lawyer and sends the data to it.

H&W has lured attorneys to this infrastructure with special programs addressing tasks that traditionally drive attorneys and paralegals crazy, such as comparing the texts of different drafts of the same document. "Drafts are being revised two or three times a day," Irwin explained, "and the ability to compare them with a program that was simple made all the difference. When they showed us the automated version, the lawyers said, 'That, I need to have.' "

There is also access to the basic electronic research tools LEXIS, from Mead Data Central Inc. in Miamisburg, Ohio, and Westlaw, from West Publishing Co. in St. Paul, Minn. These online databases are electronic libraries of statutory and court opinion files. Soon H&W will add ABANet, a network of the American Bar Association through which lawyers can exchange information.

"We're in the middle of a three-year project to do other things," Crum said. "Some cases have millions and millions of documents. We're looking at ways to bring [all that documentation] in-house instead of using outside services. We're also planning to upgrade litigation support with imaging abilities."

> *"The key technology issue is to make 400-plus lawyers look like a small law firm with everybody in the same office. We want to have the ability to get things done that simply."*
>
> *–Terry I. Crum*

Imaging allows users to search text and produce the image of the actual physical document. Experts say the signature, hand-written notations, underlining and blacking out can be more important to litigators than the text.

While the Hunton & Williams system is still growing, it is already serving its primary purpose. "When I came here almost 20 years ago, there were 67 attorneys and I was expected to know the name of each," said Irwin. "Now there are more than 400, and it's hard enough to know the names of all the partners. Apart from the attorney/client work, the computer system holds the law

formation systems and technology group of the American Bar Association in Chicago. "Attorneys by training are looking for . . . anything that can go wrong; that's how they ply their trade. You have to find the most adventuresome [among them], get some experiments going, and let them sell it to the rest."

■ Win them over. "Show them the difference something can make in their work, and you don't have to convince them," said Terry L. Crum, director of computing and telecommunications at the law firm of Hunton & Williams in Richmond, Va.

■ Go all the way. "If secretaries are using [a computer system] and lawyers are not, it's just like the old days," said Don Irwin, technology partner at Hunton & Williams. "Only when you get the whole chain—attorneys, paralegals and secretaries—on the system does it work."

■ Don't expect short-term miracles. "You can't transform a firm overnight," Irwin cautioned. The system at H&W has taken about three years to implement, he said. "We planned it that way for several reasons: first is financial; second, we wanted to debug as we went along; third, we wanted to develop a critical mass of support within the firm."

■ Get involved. Know enough about the workings of the legal department to help design custom solutions to research problems. "Ad hoc needs may arise, and they need consultative involvement," said Erim.

■ Be patient but firm. "Most [lawyers] are not technical," said Bill Pratt, systems coordinator at Swidler & Berlin, a large Washington law firm. "Some who are think they can do more than they can; the software starts getting away from them, and you [end up having] to support them. . . . You have to come up with what you will support and what you won't."

■ Know your limits. "Legal departments are crisis-based," said Erim. "Are CIOs going to get out of bed on a Saturday night and come in when something breaks on a case, or will the corporate law department need an outside relationship where they pay for that kind of help? That's a dominant issue between the corporate legal department and MIS: What kind of support will there be?"

Irwin said that to provide such support in-house you have to be a small enough firm to be able to do it quickly and simply, or a large enough firm to hire the resources you need. "Guys in the middle probably have to go with a third party, but it's really great to have control, especially when it's your money." *—K. Melymuka* firm together.

"We probably have done more and been a little luckier at it than a lot of firms," Irwin continued. And it looks like that trend will continue. "The more you do," he said, "the more ideas you get."

At the First Interstate Bank of California, Dave Werneburg had some ideas of his own. Werneburg is manager of administration and systems for the law division of the California franchise of First Interstate Bank, the nation's largest retail banking company, with banks in 21 states. The law division for the California bank, which is the largest franchise, has 27 attorneys and offices in Los Angeles and San Francisco.

Werneburg's idea was to put together a 60-PC Novell Ethernet network that would span both offices and put every attorney, legal assistant and secretary online.

A corporate legal department is different from a law firm, said Werneburg, who has handled the IS needs of both. Finding applications geared toward corporate needs was not easy. "Very few packages have insight into running . . . corporate legal department[s, which] are not concerned with fee income and generating revenue," he said. Rather, he explained, "they provide preventative law and advice to people in the bank. They try to keep the bank from becoming engaged in litigation. They try to control outside legal fees."

The bank's budget for outside litigators is twice that for inside, said Werneburg, explaining that the magnitude of a case or an exposure—a nationwide suit, a class-action suit, a suit requiring particular expertise, for example—may require an outside litigation team.

"We found that we were spending millions in outside legal assistance and needed a way to control and monitor outside legal help," Werneburg said.

"Each case has a value," he explained. "After a certain point, it no longer makes sense to spend money on it. But you can lose track. You need to get a handle on what you're spending to monitor the expense of a case versus what you think it's worth."

Another problem is case management. "If you asked the attorneys about [the status of] all the cases in-house, they'd have to start leafing through their legal pads. And if someone leaves, no one knows what time-bombs are in his files until they begin to go off. We needed a calendaring system."

> *"Each case has a value. After a certain point, it no longer makes sense to spend money on it. But you can lose track. You need to get a handle on what you're spending to monitor the expense of a case versus what you think it's worth."*
>
> *–Dave Werneburg*

Two years ago the need for a central electronic calendar became clear when water and smoke damage from a fire closed the legal department's offices for nearly a year. "Nobody had any clue what they should be doing," Werneburg recalled. "You couldn't depend on attorneys to know where they had to be. We sent in teams to crawl through the rubble looking for individual desk calendars."

Werneburg has addressed these and other problems unique to corporate legal departments with a comprehensive package called LawTrac, marketed through Syntrex Inc., an Eatontown, N.J., reseller of legal systems.

Apart from LawTrac, Werneburg is using more-common applications in unique ways. Take word processing. "It was getting to be a labor-intensive project to try to line up court forms to fill in blanks," Werneburg said. So he set up a merge program to combine unique information with boilerplate forms. "With laser printers, we just print the whole form."

Word processing is also expediting the loan process while assuring that it's done properly. "If someone in a branch tries to negotiate a loan on his own, the wording could be a bit off, and we [would] find we have an exposure: The loan is legally uncollectable," Werneburg said. The solution: "We're doing master loan agreements in piecemeal, pre-approved boilerplate parts." A local loan officer would need only to put the pieces together in order to have a pre-approved, airtight loan agreement.

In another area of preventative law, the department had one attorney on phone duty each day to field legal queries from the branches. "We spend a little time [answering questions] up front so it's done right the first time," Werneburg explained.

But information technology is providing a more efficient way of handling legal questions. Werneburg is developing a database of commonly asked questions and their answers to provide the same legal guidance without tying up the attorney.

Pushing beyond the conservatism that sometimes binds their profession, Hunton & Williams and First Interstate Bank have combined state-of-the-art networking, custom legal applications and innovative uses of common business programs to improve communication, increase efficiency and control work flow. The evidence clearly shows how IT has helped. They rest their case.

Kathleen Melymuka is a freelance writer based in Duxbury, Mass.

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Live, From New York!

. . . Or Dallas or Hong Kong, videoconferencing is well on its way to becoming a viable, fully integrated, full-motion medium

BY STEVE REYNOLDS

The 1964 World's Fair. The Jetsons. Star Trek.

Genuflections complete, what is videoconferencing? This article deals with the market for digitized, compressed video images, operating in full motion at between 56K and T1 bit rates. No frozen images, slow scan, or full 45MB, please. And no Merrill Lynch analysts playing Phil Donahue on their one-way video networks, with call-in questions from the field. Videoconferencing here means those companies that are truly the link to the future, pushing chip and digital technology toward fully integrated in-band functionality for voice, video and other imaging.

The market for such equipment and services has heretofore been small, which all players admit. There are, however, indications that an environment for significant, sustained growth in this area is about to emerge, probably in 1992-'93.

ILLUSTRATION BY ALAN MAZZETTI

As with any emerging technology, cost issues are important in determining the acceptance and future of videoconferencing. But of added interest is the question of how the technology itself will enable users to develop applications that will drive sales.

The current videoconferencing industry is coming to the end of an era. Telecommunications-sophisticated companies that were likely to adopt videoconferencing early have been identified and exploited. Initial users' reactions have been incorporated into a second round of technically improved products, and prices have dropped. A market of sorts does exist, which LINK Resources Corp. in New York estimated at $54 million in codec sales in 1989. (Codecs, which form the core of videoconferencing systems, convert analog data to digital form, transmitting it from one viewer to another.)

What the next era will look like depends on three issues. First, there has not yet been developed a codec standard. Second, availability and cost of low-bit-rate transmissions have so far limited the market to large, private-network users. Finally, codec costs and videoconferencing's ability to perform as a replacement for live meetings will depend on two things: chip development and engineering savvy.

Each of the above issues has been addressed in the last two years. Observers should note the following positive developments:

- The Consultative Committee on International Telephony and Telegraphy (CCITT) is expected to approve the H.261 video algorithm standard and the H.221 communications standard this summer. With only a low-bit audio standard yet to determine, the stage is set for future inter-vendor codec communication.
- Transmission costs from inter-

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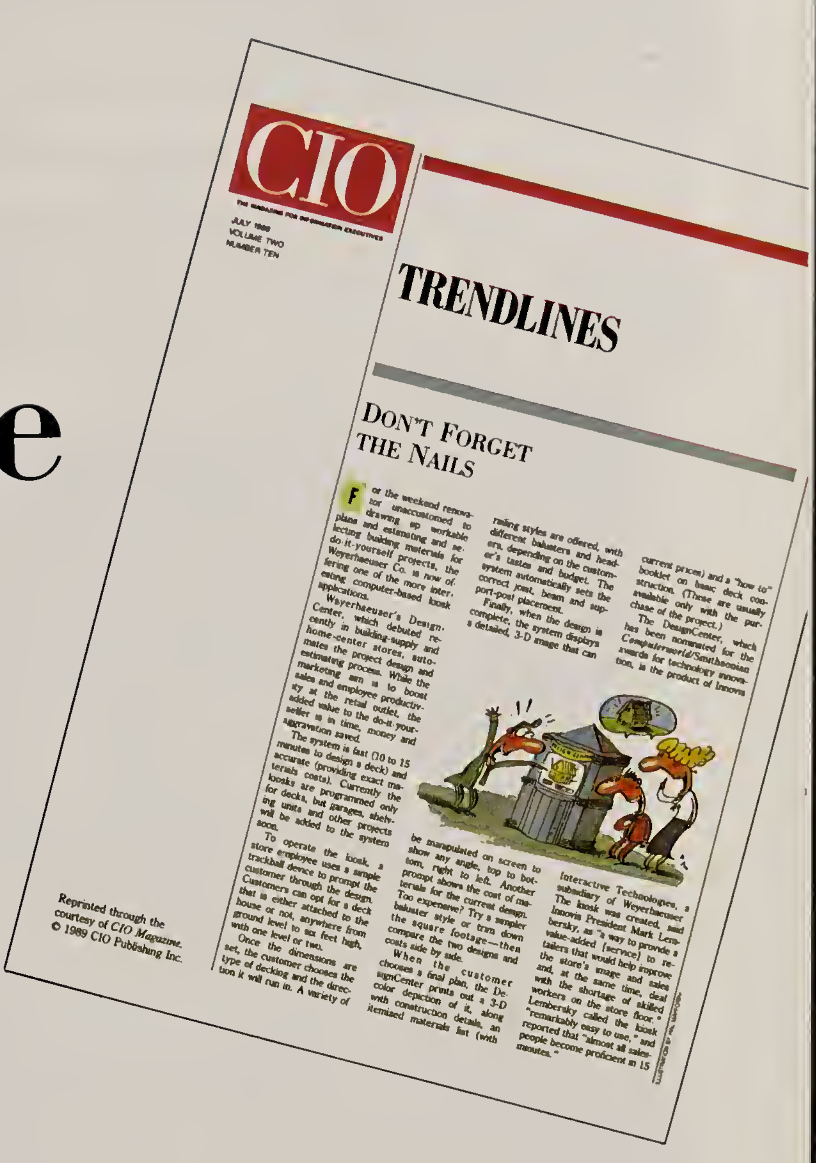

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THE MAGAZINE FOR INFORMATION EXECUTIVES

JULY 1989
VOLUME TWO
NUMBER TEN

TRENDLINES

DON'T FORGET THE NAILS

For the weekend renovator unaccustomed to drawing up workable plans and estimating and selecting building materials for do-it-yourself projects, the Weyerhaeuser Co. is now offering one of the more interesting computer-based kiosk applications.

Weyerhaeuser's DesignCenter, which debuted recently in building-supply and home-center stores, automates the project design and estimating process. While the marketing aim is to boost sales and employee productivity at the retail outlet, the added value to the do-it-yourselfer is in time, money and aggravation saved.

The system is fast (10 to 15 minutes to design a deck) and accurate (providing exact materials costs). Currently the kiosks are programmed only for decks, but garages, shelving units and other projects will be added to the system soon.

To operate the kiosk, a store employee uses a simple trackball device to prompt the customer through the design. Customers can opt for a deck that is either attached to the house or not, anywhere from ground level to six feet high, with one level or two.

Once the dimensions are set, the customer chooses the type of decking and the direction it will run in. A variety of railing styles are offered, with different balusters and headers, depending on the customer's tastes and budget. The system automatically sets the correct joist, beam and support-post placement.

Finally, when the design is complete, the system displays a detailed, 3-D image that can be manipulated on screen to show any angle, top to bottom, right to left. Another prompt shows the cost of materials for the current design. Too expensive? Try a simpler baluster style or trim down the square footage—then compare the two designs and costs side by side.

When the customer chooses a final plan, the DesignCenter prints out a 3-D color depiction of it, along with construction details, an itemized materials list (with current prices) and a "how to" booklet on basic deck construction. (These are usually available only with the purchase of the project.)

The DesignCenter, which has been nominated for the *Computerworld*/Smithsonian awards for technology innovation, is the product of Innovis Interactive Technologies, a subsidiary of Weyerhaeuser. The kiosk was created, said Innovis President Mark Lembersky, as "a way to provide a value-added [service] to retailers that would help improve the store's image and sales and, at the same time, deal with the shortage of skilled workers on the store floor." Lembersky called the kiosk "remarkably easy to use," and reported that "almost all salespeople become proficient in 15 minutes."

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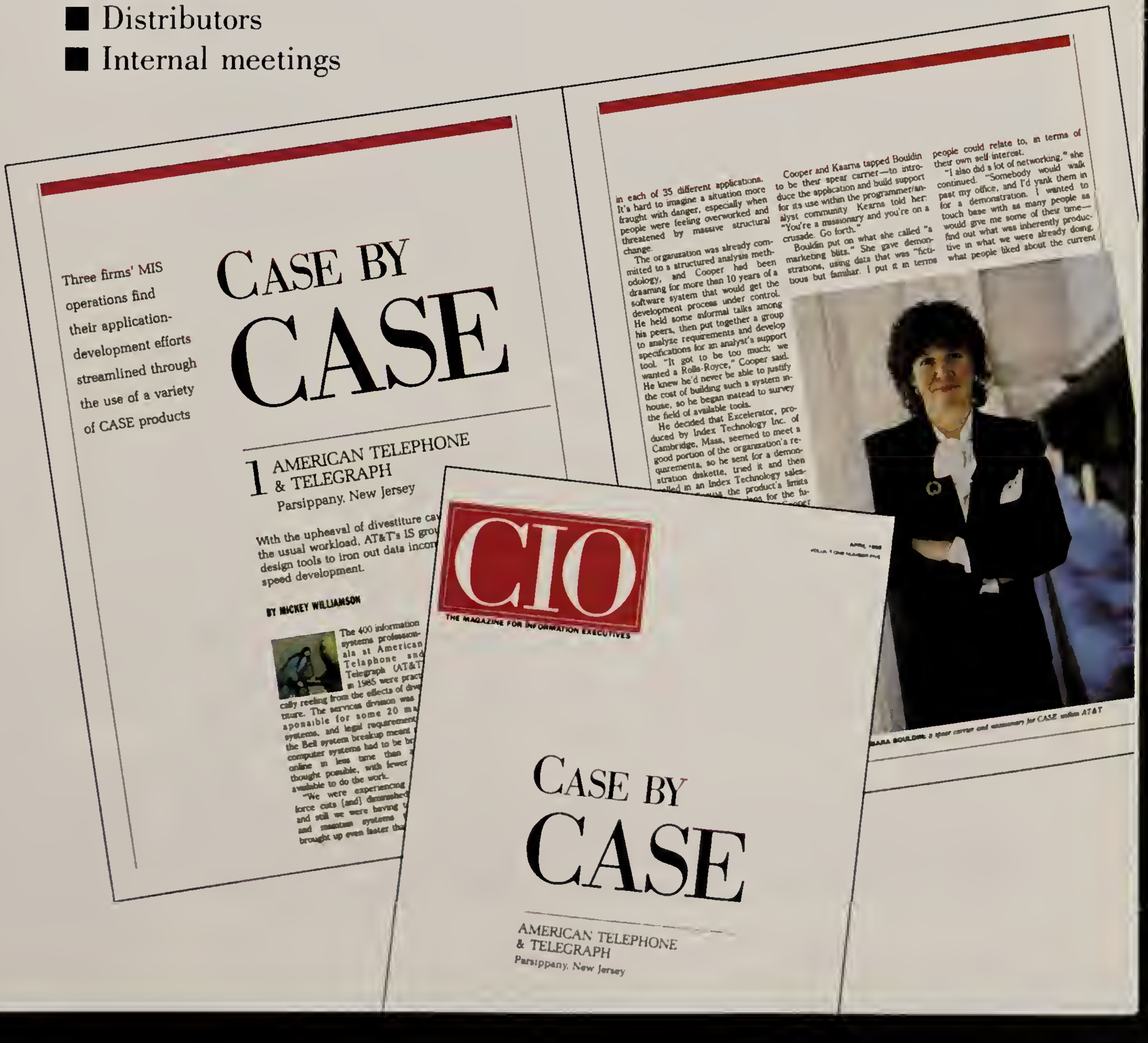

Three firms' MIS operations find their application-development efforts streamlined through the use of a variety of CASE products

CASE BY CASE

1 AMERICAN TELEPHONE & TELEGRAPH
Parsippany, New Jersey

BY MICKEY WILLIAMSON

in each of 35 different applications. It's hard to imagine a situation more fraught with danger, especially when people were feeling overworked and threatened by massive structural change.

The organization was already committed to a structured analysis methodology, and Cooper had been dreaming for more than 10 years of a software system that would get the development process under control. He held some informal talks among his peers, then put together a group to analyze requirements and develop specifications for an analyst's support tool. "It got to be too much; we wanted a Rolls-Royce," Cooper said. He knew he'd never be able to justify the cost of building such a system in-house, so he began instead to survey the field of available tools.

He decided that Excelerator, produced by Index Technology Inc. of Cambridge, Mass., seemed to meet a good portion of the organization's requirements, so he sent for a demonstration diskette, tried it and then

Cooper and Kaarna tapped Bouldin to be their spear carrier—to introduce the application and build support for its use within the programmer/analyst community. Kearns told her: "You're a missionary and you're on a crusade. Go forth."

Bouldin put on what she called "a marketing blitz." She gave demonstrations, using data that was "fictitious but familiar. I put it in terms people could relate to, in terms of their own self-interest.

"I also did a lot of networking," she continued. "Somebody would walk past my office, and I'd yank them in for a demonstration. I wanted to touch base with as many people as would give me some of their time—find out what was inherently productive in what we were already doing, what people liked about the current

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AMERICAN TELEPHONE & TELEGRAPH
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exchange carriers (IXCs) or long-distance companies, so important to this market, have been dropping. Video transmissions at 56K, which were around $150 per hour in the early days of videoconferencing, are under $50 per hour today. Likewise, transmission costs for upper-bandwidth applications have also declined, from well over $1,000 per hour in 1984 to around $500 last year. US Sprint, in particular, has been particularly aggressive in reducing these costs.

Cheap low-bandwidth service, especially switched 56K, has been trumpeted by both Sprint and AT&T as part of their network-services breast-beating. The problem for would-be users has always been at the local-exchange carrier (LEC) level. Today the RBOCs are making it much easier to bring switched 56K to user premises.

- Prices for individual codecs have also fallen—from the $100,000 range in the early 1980s to the $30,000 range in 1990. The prices of other necessary components (cameras, monitors, controlling switches) have also declined.
- Finally, chip prices are going down, and power is going up.

As solid as these factors may be, they are only logistical considerations. The future of videoconferencing depends on building effective application strategies like that used recently by a Dallas attorney in a landlord-tenant dispute. The case involved a broken lease, when the tenant alleged that promises made to him by the landlord—for instance, that he would install adequate lighting in parking areas—were never kept. The tenant convened in Dallas with a group of attorneys to give his deposition about the case. This deposition was different from most, however, in that the attorneys taking it were four states away. The entire process was handled by videoconference, through a new network established by the United American Court Reporters, a free-lance court reporting firm based in Dallas.

“That videoconference saved both sides thousands of dollars in legal fees, travel fees, and time,” said David Jackson of the Court Reporters Network. “We do that all the time with this network.”

> *Codec technology is on the way to becoming a commodity business, in which “picture quality” is not a deciding factor in its success.*

The Court Reporters is one of the few groups outside of the engineering/aerospace field that is venturing into the videoconferencing arena. Companies like PictureTel Corp. of Peabody, Mass., and industry leader Compression Labs Inc. (CLI) of San Jose, Calif., are depending on others to follow as price levels improve. “We have seen tremendous growth in orders as price has fallen, many from new industry groups,” said PictureTel’s vice president of marketing and sales, Rob Mitro.

PictureTel’s recent year-end figures showed sales of 570 units for 1989, up from about 100 in 1988, making it number-two in market share to CLI and tops for the year in unit growth. The company’s success has been its focus on lower transmission rates, especially 128K, 256K, and 384K, which are less expensive for the end user to buy from the long-distance carriers.

Another healthy sign for the industry is that its traditional users are expanding their videoconferencing operations. The Bendix Corp., a CLI customer and now a division of Allied-Signal Co. in Morristown, N.J., has six sites: five in Kansas and one in Florida. Citing improved low-bit-rate performance, the company has recently added CLI’s new Rembrandt II/06 machine to its existing network of Rembrandt 56s in Kansas, which it runs at 192K, to give it the flexibility of multi-point conferencing.

Lower bandwidth performance is essential to getting smaller companies to adopt the technology. These users often demand “application flexibility.” That usually includes:

- the ability to run a variety of different meetings—with different sized groups—with one system;
- the ability to easily run videoconferences with more than one site;
- the ability to transport systems;
- the ability to use documents, graphics, spreadsheets, pictures, computer files, faxes and other presentation pieces during a videoconference as if face-to-face, and
- extreme ease of use.

While engineering meetings probably still dominate minutes of use and there are still technical obstacles to overcome (for example, one customer complained of the need to run audio from his vendor out-of-band), demand for the capabilities listed above is prodding vendors to redesign codecs and systems. And with standardization, even those companies out in front today will have to continue to be as responsive to their markets as they have been so far.

If they’re not, there is somebody else who will step in to fill the void.

The Japanese electronics community will play hardball in this business. To date, Sony, Mitsubishi and NEC have been tinkering with the technology, although these firms typically do not move into a market without a clearly defined standard. One likely entry scenario might be that a Japanese firm or firms will develop technology as chip prices decline, finally designing a PC-level product for switched-56 “desktop” configurations that are actually adjuncts to the telephone. (This will probably have to wait for the CCITT low-bit audio standard in 1991.) Or this same community will develop the technology to where it is a “codec on a chip,” as some have called it, and aim not at the low-end business market but, yep, the home, finally creating the photophone for full-motion image.

Either of these scenarios, of course, will be bolstered by the continued emergence of ISDN or fiber-based networks. When those worlds finally evolve, videoconferencing in the home will be just one more part of life in the 21st century.

Steve Reynolds is senior analyst in voice/telecommunications services at LINK Resources Corp. in New York.

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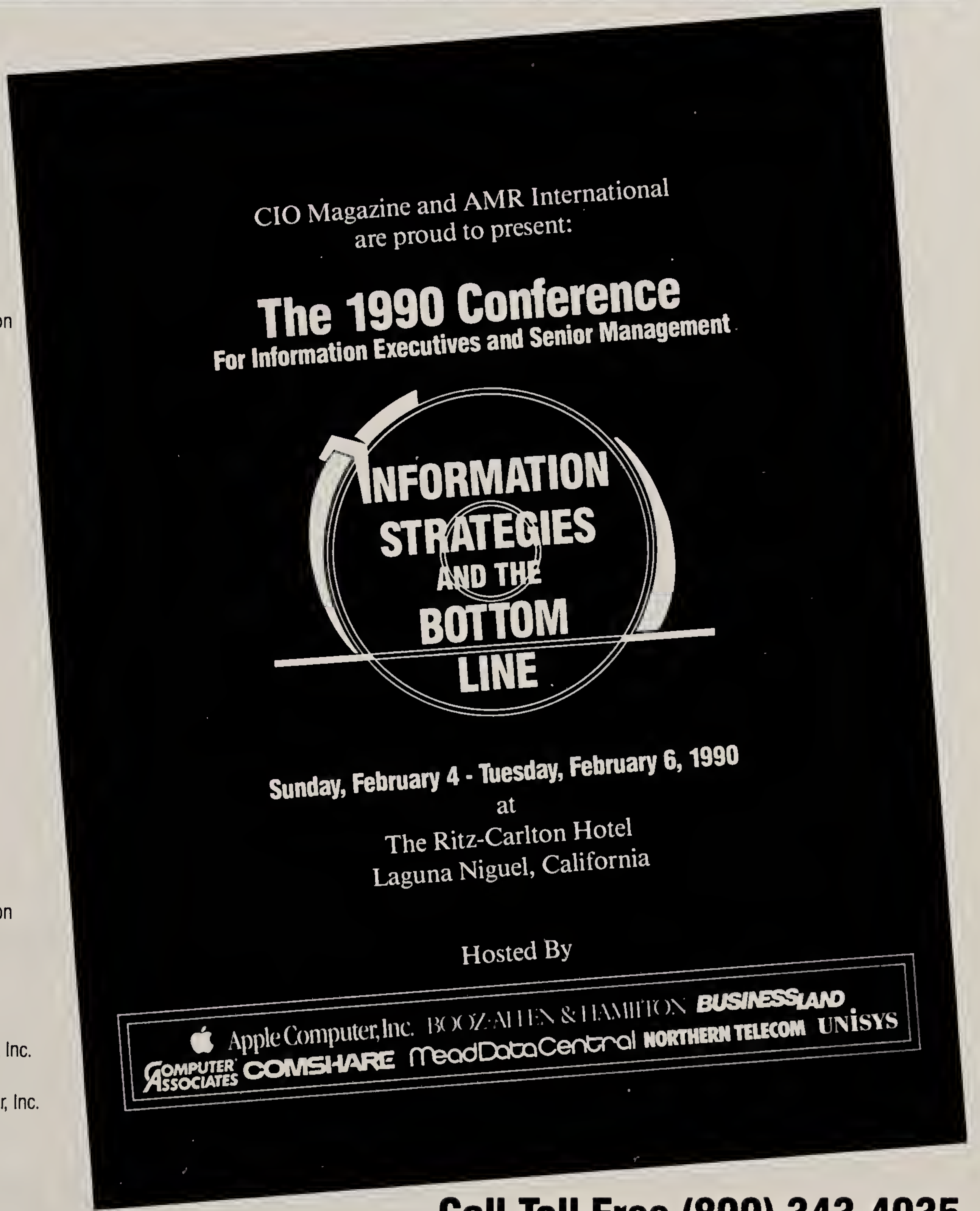

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National Conference on Artificial Intelligence

Hynes Convention Center, Boston
July 29-August 3
American Association for Artificial Intelligence
415 328-3123

Case studies, tutorials and product demonstrations highlight this conference. Topics discussed include real-time knowledge-based systems, distributed AI, hypertext and hypermedia, and evaluating knowledge engineering tools. Registration fees: $90-$315.

Applications of Artificial Intelligence and CD-ROM in Education and Training

J.W. Marriott, Washington
August 22-24
Society for Applied Learning Technology
703 347-0055

This conference focuses on applications such as the automation of instructional decision-making and the uses of CD-ROM and artificial intelligence to support development of instructional systems. Topics include intelligent training for aircraft assembly, designing multimedia CD-ROM, and designing complex databases for young learners. Registration fees: $110-$500.

Interactive Videodisc in Education and Training

J.W. Marriott, Washington
August 22-24
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703 347-0055

This conference is designed for managers involved in human resources development and the design of systems training programs. Topics include digital video, networked interactive videodisc display systems, the impact of hypermedia-based programs on hardware systems, and the role of interactive videodisc in higher education. Registration fees: $110-$500.

NCGA GIS '90

The Westin Galleria, Houston
August 26-29
National Computer Graphics Association
703 698-9600

This conference and exhibition are dedicated to mapping and geographic information systems technology. There are 40 featured exhibitors, more than 30 conference sessions and educational tours of local GIS user companies. Registration fees: $475 for members; $525 for nonmembers; $150-$175 for single day.

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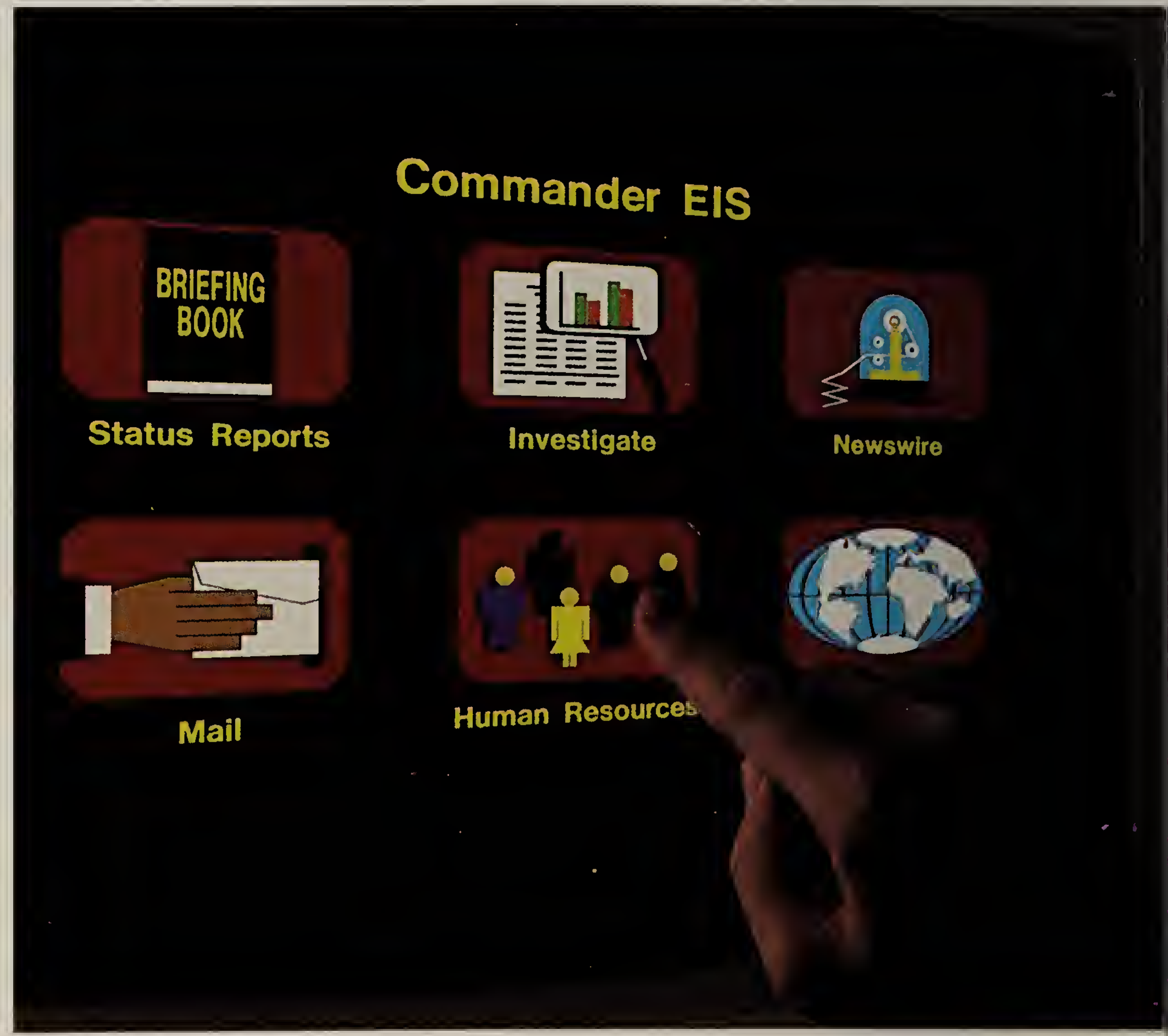

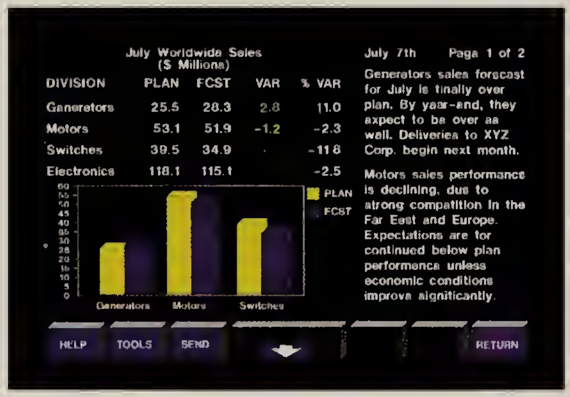

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DIVISION	PLAN	FCST	VAR	% VAR
Generators	25.5	28.3	2.8	11.0
Motors	53.1	51.9	-1.2	-2.3
Switches	39.5	34.9		-11.8
Electronics	118.1	115.1		-2.5

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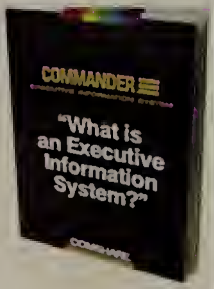

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